

MONTHLY WEATHER REVIEW.

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INTRODUCTION.

The MONTHLY WEATHER REVIEW for March, 1905, is based on data from about 3583 stations, classified as follows:

Weather Bureau stations, regular, telegraph, and mail, 176; West Indian Service, cable and mail, 4; River and Flood Service, regular 52, special river and rainfall, 363, special rainfall only, 98; cooperative observers, domestic and foreign, 2565; total Weather Bureau Service, 3258; Canadian Meteorological Service, by telegraph and mail, 33; Meteorological Service of the Azores, by cable, 2; Meteorological Office, London, by cable, 8; Mexican Telegraph Company, by cable, 3; Army Post Hospital reports, 18; United States Life-Saving Service, 9; Southern Pacific Company, 96; Hawaiian Meteorological Service, 1; Jamaica Weather Service, 130; Costa Rican Meteorological Service, 25. Total, 3583.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service; Lieut. Commander H. M. Hodges, Hydrographer, United States Navy; H. Pittier, Director of the Physico-Geographic Institute, San José, Costa Rica; Commandant Francisco S. Chaves, Director of the Meteorological Service of the Azores, Ponta Delgada, St. Michaels, Azores; W. N. Shaw, Esq., Secretary, Meteorological Office, London; H. H. Cousins, Chemist, in charge of the Jamaica Weather Office; and Señor Enrique A. Del Monte, Director of the Meteorological Service of the Republic of Cuba.

Attention is called to the fact that at regular Weather Bureau stations all data intended for the Central Office at Washington are recorded on seventy-fifth meridian or eastern standard time, except that hourly records of wind velocity and direction, temperature, and sunshine are entered on the respective local standards of time. As far as practicable, only the seventy-fifth meridian standard of time, which is exactly five hours behind Greenwich time, is used in the text of the REVIEW. The standards used by the public in the United States and Canada and by the cooperative observers are believed to conform generally to the modern international system of standard meridians, one hour apart, beginning with Greenwich. The Hawaiian standard meridian is $157^{\circ} 30'$, or $10^{\circ} 30''$ west of Greenwich. The Costa Rican standard meridian is that of San José, $5^{\circ} 36''$ west of Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by cooperative observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local standard is mentioned.

Barometric pressures, whether "station pressures" or "sea-level pressures," are now reduced to standard gravity, so that they express pressure in a standard system of absolute measures.

Since December, 1904, the Weather Bureau has received an average of about 1700 reports from as many observers and vessels, giving international simultaneous observations over the Atlantic and Pacific oceans at 12 noon, Greenwich time, or 7 a. m., seventy-fifth meridian time. These are charted, and, with the corresponding land observations, will form the framework for daily weather charts of the globe.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

Barometric pressures were prevailing low over the eastern part of the North Atlantic Ocean, and the severest storm of the month in that region visited the British coasts from the 13th to 15th. In the vicinity of the Azores pressures were high during the first decade of March, and were relatively high from the 19th to 21st and on the 31st. During the second and the greater part of the third decade, low pressures over the Azores attended the passage of storms, in several instances severe, in the higher latitudes of the ocean. Near the American coast the passage eastward of barometric depressions caused a rather regular alternation of high and low pressures.

In the United States March was a mild month, and over a great part of the interior of the country east of the Rocky Mountains the monthly average temperature was 3° to 12° above the normal. The excessive rains in Arizona and southern California, where two to three inches more than the monthly average precipitation fell, were a notable feature of the month. Farming operations were retarded in that region, and floods, largely from melting snow, caused serious wash-outs.

The month opened with a heavy snowstorm for the season over a small area of the Middle Atlantic States, the greatest depth, three inches, being measured at Washington, D. C. From the 4th to 10th a rainstorm advanced from the Middle

West and Southwest to the Atlantic coast. Heavy rains and high winds set in over California and Arizona on the 12th and continued in that section during the 13th. The Pacific rain area extended eastward over Texas from the 14th to the 17th, and reached the Atlantic coast on the 19th where it continued through the 21st, attended by freshets in rivers and streams of the central, southern, and eastern districts, descriptions of which are given under the heading Rivers and Floods.

The Atlantic and Gulf coasts were not visited by windstorms of notable severity. Gales of moderate strength occurred on the north Atlantic coast on the 21st and 22d, and on the upper Lakes on the 3d, 19th, and during the night of the 25th. Unusually severe gales prevailed along the Pacific coast on the 12th, and on the north Pacific coast during the early part of the 13th, and on the 20th, 23d, and 25th.

The occurrence of damaging frost was not noted in Florida or along the Gulf coast. Frost warnings were issued for the interior of California on the 29th and 30th.

NEW ENGLAND FORECAST DISTRICT.

The only storm of consequence was that of the 21st and 22d, during which a fierce northeaster prevailed along the entire coast. Incoming steamers and sailing vessels reported high seas and head winds, while from along the shore came reports of minor disasters. Out of a fleet of sixteen fishing vessels at

Provincetown, Mass., fourteen were driven ashore on the northwest side of the harbor by the ice field under the force of the high winds. With the high spring tides and timely assistance of the revenue cutter *Algonquin* and the tug *Peter B. Bradley* the stranded vessels were floated without great damage. Ample and timely warnings of the approach of the storm were issued.—*J. W. Smith, District Forecaster.*

WEST GULF FORECAST DISTRICT.

No marked disturbance passed over this district during March. Brisk to high winds, for which warnings were issued, occurred along the Texas coast on a few dates. Frost, for which warnings were issued, occurred over the northwestern portion of the district on the 28th and 29th.—*I. M. Cline, District Forecaster.*

CENTRAL FORECAST DISTRICT.

March was remarkable for the abnormally high temperatures that prevailed during nearly the entire month, there being but two or three days when freezing temperature occurred, and about an equal number when the temperature was but slightly above normal. There were no severe storms during the month, and no cold-wave or special warnings were issued. There were only four rain periods—7th to 9th; 17th to 19th; 20th and 21st, and the 29th.—*F. J. Walz, District Forecaster.*

NORTH-CENTRAL FORECAST DISTRICT.

The temperature continued moderate with only slight interruption, and consequently no general cold-wave warning was issued. The only severe storm which passed over the district during the entire month was one which advanced from the Pacific over the middle Rockies, and reached the Lake region on the morning of the 3d. Advisory messages were sent in advance of the storm to all Lake transportation companies that maintained winter navigation. Advisory messages were also sent to open ports in advance of a few other storms of less importance. The wind movement was far below the March average, and no accidents or wrecks were reported on Lake Michigan.—*H. J. Cox, Professor and District Forecaster.*

ROCKY MOUNTAIN FORECAST DISTRICT.

There was a notable absence of cold waves, and practically no low temperatures occurred in the district during the month. Cloudy weather was a feature with an excess of precipitation in Colorado, Utah, Arizona, and New Mexico. In Arizona the precipitation exceeded the previous record for March.—*F. H. Brandenburg, District Forecaster.*

NORTH PACIFIC FORECAST DISTRICT.

The month in the North Pacific States was mild and pleasant up to and including the 11th, when a period of stormy, disagreeable weather set in and continued almost without interruption until the close of the month. From the 18th to the 25th a succession of storms moved eastward near the International Boundary Line, each of which caused gales along the Oregon and Washington coasts, and, in one or two instances, severe squally winds in the interior districts. Unusually severe were the storms of the 20th, 23d, and 25th. At the mouth of the Columbia River the wind reached a maximum velocity of 78 miles an hour from the southeast on the morning of the 20th, and on the 23d and 25th the maximum velocity at the North Head station was 72 miles from the southeast and south, respectively. At Tatoosh Island a gale of 60 miles an hour from the southwest occurred on the 25th. Storm warnings were displayed well in advance of all storms.

Sharp frosts, injurious to early fruit and tender vegetation, occurred generally throughout the district on the morning of the 30th. Frost warnings were sent to all stations on the morning of the 29th.—*A. B. Wollaber, Acting District Forecaster.*

SOUTH PACIFIC FORECAST DISTRICT.

The month was one of unusually heavy rainfall in the southern part of the State. For a number of months back attention has been called to the abnormal conditions prevailing in the southwestern portion of the United States. Unusual

rains, noticeable as far back as last August, have continued in Arizona, New Mexico, and southeastern California, and probably in the northwestern states of Mexico. The forecaster has been aware of this abnormal condition; and forecasts of rain, showers, and thunderstorms have been made on every occasion when there was an indication of a depression over the Valley of the Colorado or the northern half of Lower California. The history of the season's forecasting shows a good understanding of the abnormal condition. Emphasis is laid upon this because in southern California some attention has been given in the public press to the claims of a so-called rain maker. This individual claimed to be able to make rain, using certain small evaporating pans and chemicals. Lately his claims have changed from "rain making" to "rain coaxing", and quite recently he has attempted forecasting the weather. His claims and work are not to be taken seriously, but the notoriety achieved illustrates how much is still to be done in the matter of educating the public in meteorology.

On March 11 a depression of some depth and large area moved southward along the coast. Rain fell from San Diego to Eureka, with high southeast winds. At Point Reyes on March 12 the wind reached a maximum velocity of 90 miles; at the Farallons a maximum velocity of 75 miles was recorded. Southeast storm warnings were displayed in ample time. In all, this storm of March 12 was one of the severest of the season. The pressure at Eureka was as low as 29.18 inches.

The entire second decade of the month was stormy. The rather unusual occurrence of storm warnings flying from San Diego to Eureka was noted on more than one occasion.

On March 28 a storm of some severity appeared on the coast and several squalls of marked severity were reported in the San Francisco Bay district. On March 29 a cold-wave warning was ordered for Winnemucca. The temperature fell 36° in twenty-four hours, reaching a minimum of 4°. Frost warnings were issued for the interior of California on March 29 and 30.—*A. G. McAdie, Professor and District Forecaster.*

RIVERS AND FLOODS.

There was but one flood period during the month. It was due to the general rains and moderating temperature from the 19th to the 22d, inclusive, and the flood area extended from southern New England westward through the Hudson and Susquehanna watersheds into the Ohio River as far west as the mouth of the Big Sandy River. In the Pittsburg district the flood attained serious proportions. At Pittsburg the maximum stage reached was 29 feet, 7 feet above the danger line, on the 22d. A stage of about 31 feet had been anticipated, and its failure to materialize can doubtless be attributed to the deficient flood volume from the Monongahela, whose watershed had been practically denuded of snow.

Warnings of this flood were first issued on the 18th, and frequently thereafter until all danger had passed. Warnings were also issued for points as far down as the mouth of the Big Sandy River, and stages above the danger line were recorded as follows: Beaver Dam, Pa., 39.1 feet, 14.1 feet above; Wheeling, W. Va., 42.9 feet, 6.9 feet above; Parkersburg, W. Va., 42.4 feet, 6.4 feet above; and Point Pleasant, W. Va., 44.1 feet, 5.1 feet above. Below Point Pleasant there was a great rise, but no danger-line stages were reached, except between Mount Vernon and Evansville, Ind., where the flood volume was augmented by the rise out of the Green River.

On Saturday, the 18th, the following general statement was telegraphed from the Central Office to stations in New York and eastern Pennsylvania:

High temperatures, with coming rain, will cause general thaw to-night and Sunday. Advisable to make preparations for movement of ice with rising rivers. Colder Monday.

The events of the next few days were in keeping with the forecast. Rains, with high temperatures, prevailed, and the

ice broke and moved out with rapidly-rising waters. Danger-line stages were passed in some places, particularly along the North and West Branches of the Susquehanna, but no damage of consequence was reported, except along the upper portion of the North Branch of the Susquehanna, where there was some flooding of bottom lands and cellars.

There was also a rapid rise in the lower Connecticut River during the last few days of the month. At Hartford, on the 31st, the stage of the river was 22 feet, 9 feet above the danger line, and Commerce street, the lower end of State street, and portions of East Hartford were flooded.

During the last week of the month opportunity was afforded for a very successful trial of the new river and flood service along the Grand River of Michigan. There was a moderate flood from the 25th to the 29th, inclusive, with a crest stage of about one foot above the danger line of eleven feet at Grand Rapids. Warnings of the flood were issued well in advance of its coming, and the new service was at once established in the popular confidence.

CLIMATE AND CROP SERVICE.

By Mr. JAMES BERRY, Chief of Climate and Crop Division.

The following summaries relating to the general weather and crop conditions during March are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau; they are based upon reports from cooperative observers and crop correspondents, of whom there are about 3300 and 14,000, respectively:

Alabama.—Warm and favorable for work. Rainfall deficient, except in extreme southwest, where it was excessive. Much upland corn planted, some up by close of month, when gardening was well advanced. Considerable cotton land prepared and a little cotton planted. Wheat improved. Fall oats proved a failure, though an increased acreage of spring oats did well. February freeze killed one-third of the peach buds, otherwise fruit prospect continued good, nearly all varieties in bloom by 25th.—*F. P. Chaffee.*

Arizona.—Excessive precipitation during the first two decades. Heavy snowfall in northern and high altitudes of southern section 8th to 20th, melted rapidly after the 23d, causing floods, which destroyed considerable property. Weather favorable for farming operations last decade, except in northern counties, where the ground was too wet for plowing. First alfalfa cut on the 27th. Wheat and barley heading, thriving well. Stock fat. Ranges good. Feed and water plentiful. Desert lands covered with grass, weeds, and flowering plants two to five feet in height.—*L. N. Jesunofsky.*

Arkansas.—The temperature was above normal and there was ample moisture. Considerable progress was made in spring plowing. Some corn and potatoes were planted, and oats sown, and in favored sections potatoes and oats were beginning to come up to good stands. Severe cold during the winter injured peach trees materially in the northern portion of the State; in other sections the injury was slight; other fruit trees wintered nicely. Apple, peach, and plum trees, and strawberries blossomed last of month.—*Edward B. Richards.*

California.—Abnormally high temperature prevailed during the first half of the month, and the precipitation was above the average, especially in the south, where phenomenal rains occurred. No material damage to crops resulted from the unusual heat and heavy rain, but severe frosts on the 30th and 31st caused slight injury to early deciduous fruits in some sections. In many places the fruit was too far advanced to be damaged by frost.—*Alexander G. McAdie.*

Colorado.—The weather was generally mild, with an abundance of moisture. Plowing was pushed in north-central and eastern counties, but in southern and western counties work was delayed by wetness of the soil. On an average one-half the area to be cultivated was ready, and seeding and planting under way. Except in the north-central and northeastern counties, the season was late. Wheat came through the winter in good condition. In parts of Custer, Delta, Mesa, and Garfield counties peach, apricot, and cherry trees were injured by the severe cold of February, but the extent of damage can not now be estimated.—*F. H. Brandenburg.*

Florida.—The month was warmer and wetter than the normal. Work was pushed to advantage, the bulk of the corn crop having been planted, and a goodly acreage to cotton. The stands were generally good. The vegetable crop was somewhat backward, owing to the cold of winter; shipments, however, began to increase during the last decade. Cane advanced very well. Citrus trees protected during the winter showed more bloom than trees not protected.—*A. J. Mitchell.*

Georgia.—March weather was favorable to farming operations; temperature considerably above normal, freezing and killing frosts confined

The ice had entirely disappeared from the rivers by the end of the month except in New England. Reports from all districts affected indicate that the ice passed out quietly, with very little gorging and resultant damage. No ice was seen at Cairo, either in the Mississippi or Ohio, after the 3d, and at Kansas City there was none after the 4th. Navigation on the Mississippi was resumed as far north as Dubuque by the 28th, while below St. Louis it began with the disappearance of the ice on the 3d.

The highest and lowest water, mean stage, and monthly range at 291 river stations are given in Table VI. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Professor.*

to northern section; rainfall far below normal, except in southern section, but generally sufficient for agricultural needs. Farmers behind with work in some sections. Corn planting was progressing over State last of month, nearing completion in south; cotton planting begun in northern, making satisfactory headway in southern half. Wheat, oats, and rye promising; oats irregular in some sections. Fruit crop generally excellent; peaches scarce in scattered sections.—*J. B. Marbury.*

Idaho.—First half of month warm and bright; latter part much cooler, with frequent high winds, rains, and snows, and some sleet and hail. Fall sown grain, hay crops, fruit trees, and shrubs wintered in excellent condition. Farm work progressed rapidly during the month. A large acreage was prepared for sugar beets. Stock was in good condition; some cattle and sheep were turned out to summer ranges.—*Edward L. Wells.*

Illinois.—The weather during the month was of marked clemency and very favorable for farming operations. Plowing and seeding, as compared with last year, were advanced three or four weeks. At the end of the month the sowing of oats in the central district was well under way or finished, and plowing was well advanced in other districts. Wheat was exceptionally promising, the plant being vigorous and well stooled. Peaches showed great injury, but other fruits were mostly promising.—*William G. Burns.*

Indiana.—The weather, especially during the latter half of the month, was exceptionally mild and favorable to farming interests. During the last week sowing oats, planting potatoes, and making gardens were in progress. Wheat was never in better condition or more promising at the last of March. Rye, clover, and meadows were also doing well. Budded peaches in some orchards were reported killed, but generally fruit of all kinds was alive.—*W. T. Blythe.*

Iowa.—Except about a week in the second decade, March was phenomenally warm. The ground thawed rapidly and the surface was generally dry enough for field work after the 20th. Spring wheat seeding was nearly completed and oats and barley seeding begun before April 1. Plowing sod ground for corn was in progress. Fall wheat, rye, and clover wintered well and grass was unusually green at the close of the month. Fruit buds showed no damage. Live stock was healthy.—*John R. Sage.*

Kansas.—Wheat was in good condition and growing. Oat and barley sowing progressed, and oats, barley, and spring wheat were coming up. Alfalfa and tame grass were growing well; wild grass was starting. Potatoes were being planted, some coming up. Ground fine; plowing progressing. Corn planting begun. Apricots blooming in the south; peaches killed; apples safe. Farm work well advanced.—*T. B. Jennings.*

Kentucky.—Season early; weather favorable, conditions unusually favorable. Winter wheat looking well and never more promising, except in east portion. Tobacco beds sown and some plants coming up. Stock poor in some instances, but improving. Some scarcity of feed, but grass and pastures doing well. Oats being sown, potatoes planted, gardens begun, and plowing done for corn, but none planted. Fruit blooming and good prospects for crop, except that peaches were killed in some localities.—*F. J. Wals.*

Louisiana.—Moderate temperatures during the month were favorable for agricultural interests, but frequent rains interfered with farming operations. Very little land had been prepared for cotton. Corn planting was pushed forward as rapidly as possible. In some places the bulk of the crop had been planted, while in others planting had barely commenced. Some corn was planted in unbroken ground. Sugar cane planting progressed slowly; seed cane was in good condition. Preparations for

rice crop were well advanced. Truck gardens were growing rapidly. Strawberries were ripening.—*I. M. Cline.*

Maryland and Delaware.—March temperatures were two degrees above and precipitation was slightly below normal. Thunderstorms occurred on the 19th, 24th, 26th, and 30th. Farm work was very backward. Plowing and planting were begun after much delay from wet ground and rains. Warm weather caused rapid growth. Wheat was much improved; early sown was generally excellent, late sown thin. Grasses very good. Clover and some oats were seeded and early gardens were planted. Some peach buds were killed.—*Oliver L. Fassig.*

Michigan.—March weather conditions were generally favorable to winter wheat and rye, which at the close of the month were in healthy and promising condition. Fruit buds were very promising; most trees were well budded and the buds had not been prematurely forced. Field work at the close of the month was just beginning in the southern counties. At the close of the month the snow and frost had almost entirely disappeared in the lower peninsula and to a considerable extent in the upper.—*C. F. Schneider.*

Minnesota.—A warm month, except from about the 9th to the 15th. The precipitation was generally below the normal. About the 14th snow covered the ground in northern, eastern, and southern portions. Frost came out of the ground, and small lakes and rivers were open late in the month. Spring wheat seeding began on the drying uplands at many points on the 27th. Winter wheat, winter rye, and clover seemed to have wintered well.—*T. S. Outram.*

Mississippi.—Uniformly mild temperatures prevailed during the month. There were some heavy rains, especially south. Farm work was backward. Many lowlands were too wet to plow; but little cotton land was prepared for planting. At the close of the month corn planting was in progress in the south and truck gardens were doing well. Spring oats were planted and came up to good stands. Fruit was generally promising, except that many peach buds were killed by the freeze in February.—*W. S. Belden.*

Missouri.—The usual characteristic features of March weather—high winds, and alternate freezing and thawing—were almost entirely absent. Wheat, rye, timothy, and clover made marked improvement and were satisfactory in growth, color, and stand at the close of the month. Plowing for and planting corn advanced rapidly; oat seeding was about completed, and potato planting finished. Fruit trees were full of bloom, except peaches, which were nearly all winter-killed. Season ten days earlier than last year.—*George Reeder.*

Montana.—The warmest March in a period of eleven years. Moisture deficient in eastern half; about normal in west, but inadequate to the needs of crops and ranges. Plowing progressed favorably where not too dry; seeding of oats, barley, and spring wheat began about the 15th. Range grass and winter wheat made a good start, but needed rain. The condition of cattle, sheep, and horses on the ranges was considerably better than is usual in spring, owing to the mild, open winter.—*R. F. Young.*

Nebraska.—March was warm, with about normal precipitation. The weather was favorable for the advancement of spring work on the farm, and the soil was in excellent condition. Considerable plowing was done and some spring wheat and oats were sown. Winter wheat started nicely and, with very few exceptions, was in vigorous, promising condition at the end of the month. Grass started early and grew rapidly.—*G. A. Loveland.*

Nevada.—First half of month mild and dry, but latter half somewhat stormy and moderately cold. Weather and soil conditions favorable for plowing and seeding throughout the month. Rye and spring wheat up and looking fine at close of month. Pastures green and range feed good; stock in fine condition; prospects for a water supply during the summer months rather discouraging on account of a deficiency of snow in the mountains.—*J. H. Smith.*

New England.—Weather colder than average for March, except the closing week, when the temperature was near the seasonal average. The precipitation, generally rain, was well distributed throughout the month, but was deficient in nearly all sections; fall very light in parts of Maine. Snow had disappeared, except in the woods and drifts in sheltered places; frost in ground, except in southeastern sections. Grass and winter grain wintered well; fruit buds were in good condition. Weather was unfavorable for sugar and crop promised to be small.—*J. W. Smith.*

New Jersey.—Early sown wheat and rye were in good growing condition; stands even, except on low fields, where ice did some injury; late sown wheat in southern portion quite thin on the ground. Meadows, both old and new, were very promising. Plowing was quite general in the southern section and some potatoes, peas, and early corn were planted.—*Edward W. McGann.*

New Mexico.—General, heavy rains until close of second decade, later some high winds and cold weather. Month favorable for farming and stock raising interests; soil in excellent condition for early plowing and seeding and work progressing at close of month. Early sown small grain coming up to good stand; alfalfa and range grasses growing rapidly; early fruits blooming in south and central districts. Stock generally in fair condition, but some losses in northeast district; early and successful lambing season promised.—*Charles E. Linney.*

New York.—The temperature was considerably below the normal dur-

ing the first half of the month, but decidedly above in the latter part. A very warm spell occurred from the 26th to the 31st, with excessively high temperatures on the 29th. Many stations reported temperatures ranging in the eighties and all former records for hot weather in March were broken. Conditions were favorable for grass and winter grain. Fruit buds appeared to be in good condition. The weather was unfavorable for making maple sugar. No plowing of any importance was done.—*H. B. Hersey.*

North Carolina.—March was highly favorable for agricultural interests in every respect. The first decade was moderately cold, but the remainder of the month was quite warm, without frosts and with moderate amounts of precipitation. All vegetation advanced rapidly. Farm work, especially plowing, made excellent progress. Wheat, rye, oats, clover, and grass made vigorous growth. Preparing tobacco beds, planting truck crops and gardens, sowing spring oats, and planting corn occupied the attention of most farmers during the month.—*C. F. von Herrmann.*

North Dakota.—The month was warmer than usual, being the warmest of its name for the past fourteen years. Considerable farm work was done the latter part, and in some few sections a small amount of wheat was sown. Live stock came through the winter very well; March as a rule is very unfavorable, but this year stock was able to graze on the prairies during the greater portion of the month.—*B. H. Bronson.*

Ohio.—The weather was very favorable for wheat and other winter grains and for grass fields, except that the need of rain was being felt to some extent. Many reported that wheat was in better condition than for several years at the end of March. Plowing and oat seeding progressed rapidly in most southern and western counties. Tobacco beds and gardens being made at close of month. Peaches thought to have been somewhat winter-killed in western counties.—*J. Warren Smith.*

Oklahoma and Indian Territories.—The highest average temperature and greatest precipitation, with one exception, of any March on record; rains were general and heavy and greatly delayed farm work. Wheat made rapid improvement and was in good condition; oat, barley, and spelt seeding progressed and early planted came up to good stands; alfalfa and grass made rapid growth; corn and cotton ground being prepared and some planted; early potatoes and gardens planted. Stock was in fair condition. Peaches winter-killed, other fruits in promising condition and blooming.—*C. M. Strong.*

Oregon.—The first half of the month was very favorable for farming operations and much plowing and seeding were done. Fall wheat stood nicely and its condition everywhere was healthy and promising. The last half of the month was rainy, and grass and forage plants made such good growth that much stock was turned out to pasture. Hops and early gardens came up nicely. Fruit was damaged slightly by late frosts.—*Edward A. Beals.*

Pennsylvania.—The last seven days of the month gave exceptionally warm weather and the conditions were unusually favorable to the development of winter grain, meadows, and vegetation in general. At the close of the month some oats had been sown and potatoes planted, plowing was in progress, clover had started nicely, and the soil was in excellent condition, except in the extreme northwest counties.—*H. A. McNally.*

Porto Rico.—The weather was favorable in general for all agricultural operations. A drought prevailed until the last days of the month in the southern section, but frequent showers fell in the remaining portions. Cane grinding progressed satisfactorily, an average grade of juice being obtained. An unusually large acreage was planted to cane and a considerable amount of small crops was put in. Coffee trees were blossoming nicely. Small crops of tobacco and cotton of average quality were harvested.—*E. C. Thompson.*

South Carolina.—With the exception of a short cool period near the middle of the month, a rainy period from the 7th to the 12th, and light frosts on the 25th, the weather was entirely favorable. Plowing, planting, germination, and growth progressed rapidly, so that practically all early corn, some cotton, and minor crops generally were planted. Truck grew rapidly and earliest was marketed. Fruit trees of all kinds bloomed freely. Tobacco came to good stands in beds.—*J. W. Bauer.*

South Dakota.—Month much warmer than usual. Though damp soil retarded preparatory field work, considerable was done, and at the end of the month spring wheat seeding was generally begun, with the soil in good condition, and grass was starting. Winter rye and the limited acreage of winter wheat came through the winter nicely and were looking well. There was no report of injury to fruit buds. Satisfactory conditions prevailed on the open ranges and stock generally was in good spring condition, having wintered favorably.—*S. W. Glenn.*

Tennessee.—The month was remarkably favorable for growth of vegetation and for farm work, which progressed rapidly. Wheat showed wonderful improvement; spring oats were up, with good stands; young clover and grasses fine; corn planting in progress; early fruits in bloom in some sections.—*H. C. Bate.*

Texas.—Moderate temperatures prevailed. Showery conditions resulted in an irregular distribution of rainfall, in many localities retarding farming operations, which were from two to four weeks behind over the greater portion of the State. Winter wheat, rye, and barley showed improvement. Fall sown oats suffered much damage in February, but the spring sown were in fine condition. Corn planting was much retarded. Preparations

SUMMARY OF TEMPERATURE AND PRECIPITATION BY SECTIONS, MARCH, 1905.

In the following table are given, for the various sections of the Climate and Crop Service of the Weather Bureau, the average temperature and rainfall, the stations reporting the highest and lowest temperatures with dates of occurrence, the stations reporting greatest and least monthly precipitation, and other data, as indicated by the several headings.

The mean temperatures for each section, the highest and

lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperature and precipitation are based only on records from stations that have ten or more years of observation. Of course the number of such records is smaller than the total number of stations.

Section.	Temperature—in degrees Fahrenheit.								Precipitation—in inches and hundredths.					
	Section average.	Departure from the normal.	Monthly extremes.						Section average.	Departure from the normal.	Greatest monthly.		Least monthly.	
			Station.	Highest.	Date.	Station.	Lowest.	Date.			Station.	Amount.	Station.	Amount.
Alabama.....	59.8	+ 3.8	Lucy.....	90	31	Anniston.....	26	1	3.70	-2.24	Spring Hill.....	11.05	Dadeville.....	1.28
Arizona.....	54.2	+ 0.5	Buckeye.....	92	25	Tuba.....	12	27	4.18	+3.31	Pinal Ranch.....	10.03	Tuba.....	0.96
Arkansas.....	57.1	+ 4.8	Parker.....	92	26	Lutherville.....	26	2	5.31	+0.03	Warren.....	10.80	Russellville.....	1.94
California.....	54.7	+ 2.7	Brinkley.....	92	27	Bodie.....	14	30	5.42	+1.68	Bowmans Dam.....	20.42	Calexico.....	0.91
Colorado.....	38.9	+ 5.2	Imperial.....	94	26	Antelope Springs.....	9	11	2.24	+1.14	Silverton.....	5.58	Conejos.....	0.23
Florida.....	66.7	+ 2.6	Lamar.....	80	26	Molino.....	31	1	3.93	+0.96	Wausau.....	7.99	Myers.....	0.18
Georgia.....	59.1	+ 3.6	Orange City.....	92	30	Diamond.....	29	1	3.03	-2.44	Cordele.....	5.61	Waynesboro.....	0.65
Idaho.....	41.2	+ 3.6	Bainbridge.....	88	31	Chesterfield.....	1	1	2.21		Landore.....	5.11	Vernon.....	0.73
Illinois.....	45.7	+ 6.0	Blue Lakes.....	76	3	Knoxville.....	8	11	2.30	-1.02	Tilden.....	3.79	Urbana.....	0.75
Indiana.....	46.0	+ 6.4	Chester.....	84	28, 31	Auburn, Markle.....	7	15	2.52	-1.26	Seymour.....	4.14	Logansport.....	1.19
Iowa.....	41.5	+ 9.1	Cobden.....	84	25	4 stations.....	1	11	2.04	+0.20	Inwood.....	3.70	Glenwood.....	0.39
Kansas.....	50.3	+ 8.5	Seymour.....	86	31	Colby.....	15	29	2.26	+1.14	Independence.....	5.68	Jetmore.....	0.33
Kentucky.....	52.2	+ 5.2	Onawa.....	84	27	Beattyville.....	22	3	4.45	-1.02	Mount Sterling.....	6.86	Franklin.....	1.95
Louisiana.....	63.2	+ 3.1	Medicine Lodge.....	86	28	Calhoun.....	33	1	6.38	+1.42	Baton Rouge.....	11.12	Port Eads.....	2.98
Maryland and Delaware.....	45.3	+ 2.3	Calhoun.....	89	6	Deer Park, Oakland, Md.....	15	2	3.16	-0.43	Bachmans Valley, Md.....	6.86	Chewsville, Md.....	0.99
Michigan.....	31.8	+ 3.3	Boettcherville, Md.....	88	29	Humboldt.....	34	11	2.32	-0.01	Mackinac Island.....	6.79	Ironwood.....	0.53
Minnesota.....	33.7	+ 7.4	Charlotte.....	87	29	Pokegama Falls.....	32	12	1.21	-0.29	Grand Meadow.....	2.88	Glencoe.....	0.30
Mississippi.....	60.7	+ 4.5	Luverne.....	77	27	Agricultural College.....	31	10	5.38	-0.54	Pecan.....	11.55	Lake Como.....	2.75
Missouri.....	50.3	+ 7.8	Natchez.....	87	27	Unionville.....	10	11	2.90	-0.33	Dean.....	7.08	2 stations.....	0.70
Montana.....	38.1	+ 8.9	New Palestine.....	88	27	Fort Logan.....	8	11	0.81	-0.14	Saltese.....	3.35	3 stations.....	T.
Nebraska.....	43.4	+ 8.2	Jackson.....	88	28	Winnabago.....	7	11	1.31	+0.19	Duff.....	4.65	Alliance.....	0.10
Nevada.....	41.8	+ 3.2	Cascade, St. Pauls.....	75	3	Winnemucca.....	3	30	1.43	+0.45	Lewers Ranch.....	5.45	Hawthorne.....	0.00
New England*.....	31.4	- 0.7	Fairbury, Grant.....	86	25, 27	Van Buren, Me.....	27	13	2.48	-1.45	Monson, Mass.....	4.56	Houlton, Me.....	0.70
New Jersey.....	39.8	- 1.5	Caliente.....	82	29	Layton.....	7	5	3.95	-0.21	Indian Mills.....	5.06	Cape May.....	2.80
New Mexico.....	47.7	+ 2.0	Cream Hill, Hawleyville, Conn.....	82	29	Elizabethtown.....	4	11	2.33	+1.85	Cimarron.....	5.42	Estancia.....	0.38
New York.....	31.2	+ 0.0	Belvidere.....	87	29	Faust.....	22	1	2.42	-0.14	Mount Hope.....	4.56	Paul Smiths.....	0.60
North Carolina.....	52.9	+ 4.1	Carlsbad.....	85	30	Snow Hill.....	20	3	2.43	-0.27	Manteo.....	5.22	Mount Holly.....	0.84
North Dakota.....	32.5	+14.5	Port Jervis.....	88	24	Larimore.....	25	12	0.87	-0.15	Hamilton.....	2.50	Donnybrook.....	T.
Ohio.....	42.7	+ 4.4	Kinston.....	88	29	Garrettsville.....	5	2	2.50	-0.70	Ironton.....	5.14	Bucyrus.....	0.22
Oklahoma and Indian Territories.....	56.4	+ 3.5	Medora.....	81	3	Healdton, Ind. T.....	21	10	4.13	+1.93	Fort Gibson, Ind. T.....	8.45	Woodward, Okla.....	1.20
Oregon.....	47.2	+ 4.9	Clarington, Ironton.....	85	29	Silver Lake.....	2	30	5.09	+0.56	Falls City.....	13.53	Grass Valley.....	0.05
Pennsylvania.....	39.0	+ 2.5	Alva, Okla.....	92	26	Smethport.....	18	5	3.86	+0.07	Girardville.....	6.57	Erie.....	1.40
Porto Rico.....	74.0		Marshfield.....	86	7	Aibonito.....	46	19	4.82		Las Marias.....	9.31	Guanica Central.....	1.05
South Carolina.....	57.8	+ 3.5	Irwin, Lewisburg.....	86	29	Central Aguirre.....	95	19			Cheraw (2).....	3.96	Anderson.....	0.89
South Dakota.....	39.0	+10.7	Mauch Chunk.....	86	29	Mayaguez.....	95	27	2.15	-1.70	Tyndall.....	6.13	Cheyenne Agency.....	T.
Tennessee.....	55.1	+ 6.7	Walterboro.....	93	31	Elk Point, Tyndall.....	84	27	0.99	-0.15	Liberty.....	6.31	Jonesboro.....	1.02
Texas.....	61.4	+ 3.5	Dover.....	85	28	Pope.....	85	28, 31	4.05	-1.53	Sugarland.....	10.71	Texline.....	0.83
Utah.....	42.2	+ 4.1	San Antonio.....	93	30	Grayson.....	83	30	4.29	+2.28	Alta.....	8.00	Cisco.....	0.17
Virginia.....	48.0	+ 2.5	Quantico.....	86	29	Lincoln.....	8	2	2.59	-1.32	Petersburg.....	4.15	Columbia.....	1.27
Washington.....	46.5	+ 4.6	Hatton.....	84	8, 9	Cedonia.....	20	12	3.33	+0.37	Clearwater.....	18.59	Wahluke.....	0.30
West Virginia.....	46.6	+ 4.8	Moundsville.....	88	29	Cusick.....	20	9, 10	4.10	+0.55	Terra Alta.....	6.46	Moorefield.....	1.45
Wisconsin.....	33.2	+ 4.2	Prentice.....	78	28	Terra Alta.....	2	2	1.62	-0.18	Watertown.....	3.12	Berlin.....	0.18
Wyoming.....	35.8	+ 6.1	Buffalo.....	74	2	Koepenick.....	20	11	1.12	-0.20	Norris Geyser Basin, (Y. N. Park).....	3.23	Fontenelle.....	T.
						Border.....	8	1, 2						
						Daniel.....	8	1						

* Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut.

for cotton planting were active, but wet weather caused much delay; gardening was also hindered and some truck was damaged by excessive rains. Some rice land seeded. Planting of sugar cane in progress. Pastures improved. Stock doing well. Fruit prospects appeared excellent.—*M. E. Blystone.*

Utah.—Temperatures above normal and precipitation below during early March were followed by two weeks of heavy precipitation with cooler weather. Farm lands were well saturated and considerable snow fell in the mountains. Much farm work was done, many fields having been sown to grain before the wet close of the month, and some grain was coming up. Winter grain was making good growth. Fruit was generally safe, except some varieties of peaches injured by frost, and was budding profusely. The range was good and stock was thriving.—*R. J. Hyatt.*

Virginia.—The month was generally favorable for the growth of all crops, the weather being for the most part bright, sunny, and warm. Precipitation was somewhat deficient, but not enough so to be detrimental to the advance of vegetation. Winter wheat, oats, and rye came through the month very well. Spring work was advancing. Pear and cherry trees were blooming.—*Edward A. Evans.*

Washington.—The weather was so mild and dry the early part of the month that farmers began plowing and spring sowing about three weeks earlier than usual. Rains interrupted soon after the 15th. Fruit blossoms, brought out early by the warmth of the fore part of the month, were somewhat injured by frosts at its close. The weather was favorable for winter and spring sown wheat and early planted vegetables. Winter wheat looked well, and spring sown was coming up well.—*G. N. Salisbury.*

West Virginia.—Good rains fore part and mild, pleasant weather latter part of month brought vegetation forward rapidly. Wheat and rye were in rather poor condition, but were starting nicely. Grass was green, fruit buds were swelling, considerable plowing had been done, some potatoes planted, and some oats sown. Stock wintered fairly well, but there was some scarcity of feed. The prospects for fruit appeared to be good.—*E. C. Vose.*

Wisconsin.—The month was mild throughout, except from the 10th to the 12th, when a moderately severe cold wave overspread the State. The snow disappeared generally about the 15th. Winter wheat, rye, and grasses came through the winter in excellent condition. Some seeding was done in the southern counties during the last week of the month.—*W. M. Wilson.*

Wyoming.—The month was unusually mild throughout the State and very favorable for the stock, which came through the winter in excellent condition in nearly all sections. Over the earlier sections plowing began early in the month, and by its close seeding was well advanced over much of the State, and completed in some of the earlier sections. Range grass made a good start by the close of the month.—*W. S. Palmer.*

SPECIAL ARTICLES.

APPLICATION OF MATHEMATICS IN METEOROLOGY.

By Prof. FRANK HAGAR BIGELOW.

[Read before the Philosophical Society of Washington, January 17, 1903. Reprinted from the Bulletin of the Philosophical Society, April, 1903, vol. 14, p. 215.]

There are three processes that are generally essential for the complete development of any branch of science, and they must be accurately applied before the subject can be considered to be satisfactorily explained. The first is the discovery of a mathematical analysis, the second is the discussion of numerous observations, and the third is a correct application of the mathematics to the observations, including a demonstration that these are in agreement. As a matter of fact, however, the history of science shows that there has been great difficulty in the course of the working out of new problems to bring this about satisfactorily. Sometimes the theory is in advance of the observations, as in Maxwell's theory of electricity and magnetism. Again, the observations are in advance of the theory, as in solar physics and terrestrial magnetism. Often a good theory is misapplied to good observations, or good observations are explained by a poor theory. Whenever any of these unfortunate procedures take place the progress of science is retarded. When a good theory is misapplied, there must follow it a searching criticism and all things must be rebuilt from the foundations. Thus, the Ptolemaic cycles and epicycles were good as theory for a geocentric solar system, but the Copernican and the Newtonian theories could be applied to Kepler's observations only by a complete destruction of the ancient astronomy.

There is perhaps no branch of modern science that has suffered more severely than meteorology by the misapplication of good mathematics to good observational data. Of course in this case, as in other instances, the observations, while good so far as they went, did not sufficiently cover the field of research, so that it was possible to propagate theories which apparently harmonized with the observations then at hand. Thus, for more than half a century the atmospheric observations were confined to the surface of the earth or to the very lowest layers of the air. It is only within ten years that the upper-air observations have been made in sufficient numbers to fix our attention upon the true circulation of the great currents of air in the general cyclone and in the local cyclones and anticyclones. The data obtained by the cloud computations, or by the balloon and kite ascensions, have made it possible to examine critically the existing theories, with the unfortunate result that nearly the entire range of general theory of the circulation of the atmosphere must be pronounced a misfit. Had the modern observations been in the hands of Professor Ferrel or Professor Oberbeck, it is hardly possible that they would have written as they did. Indeed, there are probably very few scientific theories which have had a wide acceptance against which such grave and intractable objections exist as against the vertical convection theory of the origin of storms by Espy, which derives the source of the energy expended in cyclones from the local condensation of aqueous vapor and the setting free of the equivalent latent heat. It is not my purpose to review this subject in detail, as that has been done elsewhere, but I wish to summarize the mathematical state of the problem in a few words and to indicate the direction in which the great theories of meteorology will probably be reconstructed.

LOCAL CYCLONES AND ANTICYCLONES.

(1) Espy-Ferrel theory.—Speaking generally, the problem of cyclones has been treated as independent of that of the general circulation. Local sources of heat, forming ascending central columns of air have been assumed, as the generating energy of the cyclonic vortices, quite apart from the great excess of temperature in the tropical zones which produces the general vortex covering a hemisphere. Ferrel assumed that the

hemispherical vortex and the local vortex are similar in structure, but quite independent of each other in the sources of their energy. He drew a bounding surface around a mass of air, warm or cold at its center, as the case might be, and discussed the resulting vortex. The laboratory confirmed the derived circulation by placing water in a cylindrical vessel rotating as a whole about a vertical axis, the central portions being heated or cooled, or else having a vertical central current produced mechanically. There was no mathematical objection to the Ferrel vortex itself, nor to the laboratory experiment, until it was attempted to match these results with the observed atmospheric facts. Meteorologists who were in any ways critical have found such difficulty in accounting for the local supply of central heat as to be quite doubtful about the value of Espy's source of energy, and this source was reluctantly adopted by Ferrel himself. The Weather Bureau observations of 1896-97 traced out the stream lines of circulation with sufficient exactness to terminate this part of the discussion, by showing that in the local cyclones and anticyclones the air does not circulate as the Ferrel vortex requires. Hence, we conclude that Ferrel's application of mathematical analysis to the explanation of cyclonic observations is not satisfactory. This eliminates a long section from the literature of meteorology.

(2) The German school of meteorologists, Reye, Mohn, Sprung, Oberbeck, began with another type of vortex motion, having also a beautiful mathematical analysis, depending upon a local overheated central column. Here, again, the objections are prohibitory, first as to the origin of the cyclonic heat for vertical convection, and, second, as to the nonconformity of the observed stream lines with the theoretical vortex.

These two types of vortices are entirely distinct from each other: Ferrel's has a cylindrical bounding surface, a zero velocity where the direction of gyration vanishes, and stream lines continuous within the same mass of liquid; the German vortex has no outer boundary, but a circumscribed inner region with vertical velocity increasing as the height, an outer region with no vertical component, and a maximum velocity at the separation of these two regions. One may frequently observe the German vortex in snow or dust whirls, when the currents of air are sharply deflected by walls and adjacent buildings. It is necessary, therefore, also to exclude the German vortex from modern meteorology, and this removes another large chapter from its literature. Fortunately, the treatment of the tornado vortices has been substantially correct, but meteorology must make a fresh start with the theory of cyclones and anticyclones. A series of suggestions can be found on this subject in my recent reports as to the kind of work required; but the task is one of great difficulty, and it may require much labor to finish it.

THE GENERAL CYCLONE.

The history of the theory of the general cyclone is very similar to that of the local cyclone. There exist two great analytic discussions, Ferrel's and Oberbeck's, and, while they have much in common, the results partially contradict each other and they are only in partial agreement with the observations. In the case of the general circulation the analysis and the observed conditions harmonize better than in that of the local cyclone, and it is therefore necessary simply to improve the details of the analysis, although the general circulation is really not so simple as is called for by that theory. To illustrate briefly, Ferrel derives a very powerful eastward movement at the poles and a vanishing motion at the equator, while Oberbeck reverses this conclusion. Ferrel and Oberbeck make a powerful northward component in the upper strata of the atmosphere and a strong southward component at the surface; but observations show that a very feeble poleward component is flowing in the upper air, and that in the

lower air a series of irregular currents pass each other on the same levels instead of above one another at different levels. The canal theory found a laboratory experiment to match it by heating water at one end of a long box, when the resulting motion apparently satisfied the mathematical analysis, though that was before the international observations were made.

My reconstruction process is quite simple in conception, but intricate in its details. For the local vertical central convection current is substituted a general system of horizontal currents flowing from the Tropics and polar zones, respectively, into the middle zones. For the general canal theory of the overflowing strata is substituted a counterflow of currents in the lower strata, and on the same levels. The cyclones and anticyclones are due to the interaction of these horizontal currents of air of different temperatures, which transport the enormous energy derived from the solar radiation in the Tropics, and expend it in raising the air in the polar zones to a higher temperature, the cyclones being the mechanical products of this thermodynamic process. The observed stream lines and the computed isobars in the higher levels point to this view in the most positive manner, and it is itself in harmony with the requirements of thermodynamics as well as hydrodynamics, assuming a type of engine which is constituted like that of an atmosphere heated in the equatorial regions of a rotating globe. Unfortunately for meteorology, this statement shows that it is now necessary to reconstruct a great portion of the old theory of the general cyclone, and to reject entirely the theories which have been proposed to explain local cyclones and anticyclones.

The reversal of important scientific researches by the progress of investigation is so common in the history of science, that it brings no discredit upon students who have explained matters according to the data in their possession. Indeed, Lord Kelvin considers it to be a "point of honor" to make such reversals for one's self in the interests of perfect scientific truth, and he has set the world an illustrious example of this high-minded candor and self-effacement. Thus, a half century ago he regarded the ether as subject to gravitation, but he now treats it as a substance outside the law of gravitation. He developed his famous theory of the atoms consisting of the ether isolated in dynamic vortices, but now regards this idea as untenable and has taken up again the old Lucretian mass atom as most likely to prove correct. In his presidential address of 1893 he gave an example to show that the sun and the earth have no causal magnetic connection, but it is understood that he now thinks that the observed synchronism between the variations of the solar faculae, spots, and prominences on the one hand, and the elements of the terrestrial magnetic field on the other, is so persistent as to make it necessary to reverse that conclusion. The influence of an apparently valid result of the discussion of observations by a scientist of undoubted ability, fortified by a powerful mathematical treatment, sometimes turns aside the advance of knowledge into a wrong path, and this may even stop for a time all further efforts to solve the problem. Such failures, of course, should be reckoned as only the profit and loss in the book-keeping of research, and such temporary checks must not be taken too seriously.

THE THEORY OF LEAST SQUARES IN METEOROLOGY.

Professor Schuster has recently urged upon meteorologists the importance of submitting their researches to the analysis of the Fourier series, and the theory of least squares, in order to test properly the periodicities derived from the observations, and he has illustrated his views by applying his periodogram or probability curve to check the various periods that have been derived for the solar rotation. Fourier's Theorem has already been widely used by meteorologists to express many of the periodic functions observed in the atmosphere, and some prefer this method to the numerical or the graphic

methods, in spite of its great additional labor. Astronomers and physicists have used the probability theorem freely and with valuable results, but only in certain restricted classes of observations. This theorem requires that the events shall be *independent of each other*, and if this criterion fails, then the entire process is invalid. Thus, the independent observations on a star's place, the separate measures of a physical quantity in the laboratory, and such like matters, may be tested for probable accuracy by this method. The distribution of all the waves emitted by a black body at a given temperature T being according to the law of errors, this may be computed as a probability curve, since the normal energy gives a spectrum curve with lines of variable intensity for the several independent wave lengths. In the kinetic theory of gases, the several independent velocities which inhere in the moving molecules may be tested for their respective intensities when the total kinetic energy of the mass is known.

Suppose, now, one proposes to apply that theorem to the events recurring in the circulation of the earth's atmosphere such as the temperature changes, the variations of the pressure in cyclones, or the observed conditions of the aqueous vapor as vapor tension or precipitation at a given station. What reason is there to assume that these elements as they occur from day to day are independent of each other? The pressure, temperature, and vapor tension at a station are in fact the results of a very complex circulation which passes over a station as the effect of conflicting currents flowing from the polar and tropical zones, due to the incessant struggle of the elements toward equilibrium in this thermodynamic medium. We have to deal with no single system of independent events, as the waves in a normal energy spectrum, or the molecular velocities in a gas of given energy, but there are many series of interdependent events inextricably interwoven. It is seldom that the meteorologist has a pure series of events to work with, as the astronomer or the physicist has in many of his observations, and that is why the meteorologist has a peculiarly difficult task, and why his science is not yet perfected. Nevertheless, these problems are most fascinating, and they will probably in the future engage more of the attention of astrophysicists and of mathematical physicists, because they afford concrete examples of the most profound questions in theoretical physics.

THE THEORY OF LEAST SQUARES IN SOLAR PHYSICS.

When we come to solar physics the case is even more troublesome. There we have at an enormous distance from us an immense mass of seething matter at very high temperatures. From observations on the surface phenomena of the sun, the inference is inevitable that all the intractable conditions which on the earth render it difficult to apply the probability theorem are there multiplied in their complexity. The recurrences of the spots, faculae, and prominences on the surface of the sun are simply resulting products of very complex processes going on in the interior, and in the circulation attendant upon the readjustments of its thermal equilibrium. If the solar radiation falling on the earth's tropical zones produces the observed complex circulation of the atmosphere with its interdependent current systems, how much more should this be true in the sun's circulation. By so much more will it be impracticable to apply correctly the least-square theorems or the potential theorem, as Professor Schuster has attempted to do in various ways. We must for the present, until the true nature of the physical problem is understood, approach the solution by more simple, practical methods. It only paralyzes the efforts of students to have negative results derived from mathematical analysis laid down as decisive, and the only effect is to hinder such advances as can probably be made by the simpler graphical or numerical methods.

Take, for example, the rotation period of the sun, which has been determined many times from the recurrence of various ter-

restrial and solar events. On the surface of the sun we observe a synodic period of 26.68 days at the equator, a longer period of 27.30 days at latitude 12° , and still longer periods at higher latitudes approaching 29.50 days near the poles. There is evidence that the period varies also with altitude as well as with latitude. Now, several periods computed in the terrestrial field have been announced to be about 26.00 days—that is, three-fourths of a day shorter than the period observed at the solar equator, which is the smallest period that can be seen on the surface of the sun. Is it probable that at the distance of the earth the angular velocity is much larger than the greatest visible in any part of the photosphere? We may note in regard to the several discussions of this subject that the motion of the atmosphere relative to the surface of the earth, which carries with it the thunderstorms, the aurora, and the electric potential, has not been eliminated from the computed periods. This should be done, and it would result in lengthening the 26.00-day period. Several of these solutions have been executed by least-square methods in one form or another, and the fact that there has been a general failure to come to any agreement as to the true period of the sun's rotation influenced me to employ a simple computation and tabular exhibit of the facts, which would exhibit the periodic events as they occur. On laying down the azimuth angles of the deflecting vectors of the earth's magnetic field in long tables, a marked periodic phenomena became evident, and it persisted through the series of fifteen years over which the work was extended. Now, while it was easy to note the general features of this periodic action and to mark the dates of transition in azimuth, the periodic recurrence was attended in general by an irregular sliding backward and forward through short intervals on both sides of the mean, causing a lap of a day or two on each side of the average periodic time. The actual dates were marked down; an approximate period and epoch were assumed; the system of residuals was determined between the observed and computed dates, and then the adjustment of the assumed period and epoch was made by least squares. It is undoubtedly proper to apply least squares to these data. This unsteady action in the 26.68-day period is like that occurring in the 11-year sun-spot period, which has similar irregularities, some individual periods being longer and some shorter than the average, but from these one can compute the mean period, as Professor Newcomb has recently done by the same least-square process. Now, in the case of the resulting 26.68-day rotation-period there is a further complexity to be considered. The intensity curve is not simple, but it is one having several crests about three days apart, and this shows that the solar output is very unsteady in longitude as well as in latitude. If this curve is developed quite loosely in longitude and the crests move back and forth, as is natural in such a congested struggling medium, then there is a tendency for the crests of the curve in one period to fall upon the corresponding hollows in another period, and thus the maxima and the minima neutralize each other. The result of this fluctuating action is that there is an excessive waste in the summation of the numerical matter, whether by the graphic or the periodogram methods, and the inference that no average period exists is a misapplication of the logical conclusions that should be made. If, then, a fixed period is adopted, and the least-square theorems are rigidly applied as if the events were simply independent and recurring at random, a negative result will certainly be obtained.

Hence, it is evident that one should be very cautious in the application of mathematical analysis to the observations of solar physics generally, and, without such caution, negative results will have very little critical value. It may be well to point out in this connection that the 11-year period of solar-spot formation is confined to the middle latitudes of the sun, from $+35^\circ$ to -35° , and that both polar regions are quite

free from this special periodic phenomenon. This result was obtained from the discussion of the Italian observations on the solar prominences, which in the middle zones have the same 11-year period as the spots and the faculae, but do not continue with this period into the polar latitudes. That fact suggests that too much emphasis may have been laid upon the 11-year synchronism in discussing these solar-terrestrial problems. On the other hand, I have found a 3-year cyclic recurrence which is more characteristic of the entire surface of the sun, and this short cycle has been shown to exist simultaneously in the terrestrial magnetic field, also, in the pressure and temperature variations, and hence in the circulation of the atmosphere generally. It is quite likely that we shall find in this short cycle more evidence of synchronism between solar and terrestrial events than in any other period that has been examined.

In conclusion, we may observe that profound mathematical analysis does not guarantee that the simple law inherent in the physical conditions observed has been secured. There are enough failures of that kind to make one suspicious, because it often happens that the mathematical symbolic language of the equations obscures the implied thought, which is in itself simple, such as might first be brought out by graphical methods. Also, it is evident that negative results have very inferior weight when they proceed from intricate discussions, if the observations naturally bear another interpretation, for the unsuspected secrets of nature still contain surprises to man's inquiring reason.

TORNADO IN EASTERN ALABAMA, MARCH 20, 1905.

By FRANK P. CHAFFEE, Section Director, Montgomery, Ala.

The tornado was first felt about 6:20 p. m. (seventy-fifth meridian time) of the 20th, at Doublehead, in the northern portion of Chambers County, where one frame building was demolished, one person killed, and two severely injured. The storm crossed the track of the Central of Georgia Railway about two miles north of Welsh, near a settlement known as Bacon Level, where several frame houses were destroyed and four persons seriously injured. A few miles farther east, on Wilson's Plantation, ten people were seriously injured and one frame house demolished; on Holley's Plantation, in the same vicinity, a frame house was blown down and an entire family, consisting of seven persons, was killed and two persons were seriously injured. From this point the storm curved northward to Lime, Randolph County, where several frame buildings were destroyed, and two persons were fatally injured. The storm then passed off northeast into Heard County, Georgia.

The tornado occurred in the southeast quadrant of a general storm eddy, which moved northeastward across northern Alabama on the afternoon of the 20th. It lasted but a few minutes; its path, which extended from southwest to northeast, was about eighteen miles long and varied in width from 75 to 200 yards. It is reported that a well-defined funnel-shaped cloud was observed, which had a bounding motion and which seemed to contract as it struck the ground at points of greatest destruction, the cloud swelling each time it left the ground. A crackling, rumbling noise was heard from the cloud, around which bright, but not particularly vivid, lightning played. In the center of the path debris was carried forward, while on the outer edges much of it was carried in the opposite direction. The funnel-shaped cloud was very dark, and was accompanied by a heavy downpour of rain, the latter lasting about ten minutes.

At Montgomery, about 72 miles southeast of where the tornado started, warm, unsettled weather prevailed during the afternoon of the 20th, with a maximum wind velocity of 22 miles per hour from the southwest.

Total number of persons killed along the storm's path, 9; fatally injured, 2; seriously injured, 18; estimated damage to buildings, timber, and fences, \$5000.

The accompanying sketch shows the section of country traversed by the tornado. (See fig. 1.)



FIG. 1.—Track of tornado in eastern Alabama, March 20, 1905.

STUDIES ON THE DIURNAL PERIODS IN THE LOWER STRATA OF THE ATMOSPHERE.

II.—THE DIURNAL PERIODS OF THE BAROMETRIC PRESSURE.

By Prof. FRANK HAGAR BIGELOW.

THE STATUS OF THE PROBLEM OF DIURNAL PRESSURE.

The physical relations between the waves of temperature and pressure in the lower strata of the atmosphere, together with their influence upon the electrical and the magnetical fields in the air, have formed subjects of constant investigation during the past forty years, but, unfortunately, without any satisfactory results. In my International Cloud Report, Weather Bureau, 1898, chapter 9, some account of the problem was given, and an attempt was made to throw some additional light upon the subject. The principal point brought out was the fact that there is a very close connection between the variation of the pressure and the magnetic fields over the earth, although I was unable to show what the physical process is which unites them. The papers of this series are supplementary to that investigation, and they show that two important elements have been lacking in the terms of the problem; namely, the variation of the temperature with the height, and the existence of streams of ions or free charges of electricity in the lower atmosphere. Without them it was not possible to explain the connection between the several types of observed phenomena.

There have been in general two lines of attack upon the problem of the coexistence of the single, the double, and the triple barometric waves, as determined by the harmonic components: First, that they are due directly to an effect of the temperature upon the pressure by a change in the density of the lower strata of air; and second, that a dynamic-forced wave is generated chiefly by solar radiation acting in the upper strata of the atmosphere. However, it has not been possible to associate the surface-temperature wave with the semidiurnal and the tri-diurnal waves of pressure, because it has been assumed that the surface-temperature wave extends with the same periodic phase into the lower strata. We have shown in the preceding paper that this is not the case, and that there is now sufficient reason for reopening the problem at this place. Regarding the solution by a dynamic-forced wave, it has become more evident from the studies of the absorption of the solar radiation, by means of the bolometer and the actinometer, that the solar energy can not build up temperature and dynamic waves in the upper strata, because the solar radiation is of such short wave lengths as to traverse the earth's atmosphere without general absorption. The outgoing radiation of much longer wave lengths from the earth's surface does, however, suffer absorption, so that such dynamic effects must belong to the lower, rather than to the higher, strata of

the atmosphere. Further studies have been made by the Austrian meteorologists, Margules, Hann, and Trabert, in a series of interesting papers², since the year 1898.

It may be remarked that these discussions are confined to an account of the double period, apart from its natural combination with the single and triple periods. Suitable periodic variations of the coefficients, in latitude and longitude, were not to be found in the observations at the surface stations, nor at the mountain stations, and there was no data derived from the free air levels. Contact with the ground at low levels, or at high elevations, seems to have destroyed the actual temperature waves found in the free air at 400 meters and upward. It will, no doubt, now be possible to adapt these admirable mathematical studies of the Fourier series, as modified by the deflecting force of the earth's rotation and by friction, to the new temperature data pertaining to the strata up to 3000 meters elevation in the free air.

In order to place before the reader a brief summary of the facts of the barometric pressure waves which are to be explained, the following extract is quoted from my Cloud Report, pages 458, 459.

Analyzing the observed barometric pressure by the harmonic series, $\Delta B = a_1 \sin(A_1 + x) + a_2 \sin(A_2 + 2x) + a_3 \sin(A_3 + 3x)$, and discussing the constant in respect to the observations, it is noted:

1. The normal value of the amplitude of the single daily oscillation a_1 is contained within the limits 0.00 and 0.50 mm. It is one-fourth to one-half the amount of a_2 ; its range is wide, being two or three times the normal value; it is very different at neighboring stations, and on the same parallel of latitude; it has greater amplitudes in mountain valleys, but smaller on the seacoast and in higher latitudes; it shows a reversal of phase in the polar regions, also above a certain neutral plane at a given elevation from the ground, produced by interference with the thermic wave; it has a yearly period, with maxima in June in higher latitudes, and in March and September on the equator.

2. The normal value of the phase A_1 is near 0° , where x is counted from midnight, and is the hour angle; it varies widely, from 277° to 55° , a_1 and A_1 must have a general and a local cause. The general cause varies with the latitude and also in the year; the local cause varies with the minor convection currents, and depends upon all the meteorological features which tend to produce local convection.

3. The amplitude of the double daily wave, a_2 , is the principal term, and covers the limits 0.00 to 1.00 mm. of pressure. Its range is very narrow; it decreases regularly with the height proportionally to the pressure $\frac{B}{760}$; it is very constant over the entire earth up to latitude

55° ; it varies with the latitude by a formula which requires an inversion of phase in the polar regions; it has a distinct variation with the year, but exhibits the following peculiarity, namely, that while the maximum insolation is in January at perihelion, the maximum of the semidiurnal wave is at the equinoxes in March and September; also the fact is remarkable that the sun in one hemisphere does not change the amplitude of the wave in the other hemisphere; it combines with the single "thermic" wave, but it is not controlled by it to any appreciable extent; it is smaller on seacoasts, islands, and on mountain tops, and is diminished a little by land and sea breezes; it is very large in mountain valleys.

4. The normal value of the phase of the double diurnal wave A_2 is 155° , corresponding to 9^h 50^m a. m.; its range is very small, 148° to 163° ; it diminishes a little with the height, is retarded to 145° in higher latitudes, varies a little with the year, though in an opposite sense in the two hemispheres, and it is very independent of local meteorological influences.

5. The amplitude of the triple diurnal wave, a_3 , is a very small quantity, being generally less than 0.10 mm. pressure. It diminishes a little with the latitude; its yearly period is very marked, and has maxima in winter and summer in both hemispheres, with minima at the equinoxes; its maximum is, however, in June, when the earth crosses the sun's equator, and not in July, when the heat is greatest in the Northern Hemisphere.

6. The phase of the triple daily period, A_3 , has a normal value of 355° , with very small range, and with a small but very well marked yearly period.

² Ueber die tägliche Drehung der mittleren Windrichtung und über eine Oscillation der Luftmassen von halbtägiger Periode auf Berggipfeln von 2 bis 4 km. Seehöhe. J. Hann. Wien. 1902.

Same in Meteorologische Zeitschrift. Oktober, November, 1903.

Die Theorie der täglichen Luftdruckschwankung von Margules und die tägliche Oscillation der Luftmassen. W. Trabert. Met. Zeit. November, December, 1903.

¹ See Monthly Weather Review, December 1902, figs. 3 and 4.

TABLE 1.—Diurnal, semidiurnal, and tri-diurnal pressure waves observed at the surface. Unit = 0.001 inch mercury.

Hours.	January.				February.				March.				April.			
	$\Delta B.$	I.	II.	III.	$\Delta B.$	I.	II.	III.	$\Delta B.$	I.	II.	III.	$\Delta B.$	I.	II.	III.
12a	0	-1	+1	0	0	-1	+1	0	-1	+1	0	0	0	-1	+1	0
1	-3	+2	-9	-4	-2	+2	-7	-3	0	+4	-5	+1	0	+3	-3	0
2	-5	+4	-15	-6	-5	+3	-14	-6	-3	+6	-12	-2	-4	+7	-11	0
3	-6	+4	-15	-6	-7	+5	-17	-5	-4	+10	-16	-2	-5	+12	-16	-1
4	-6	+7	-13	-6	-7	+8	-16	-1	-3	+13	-16	0	-2	+15	-16	-1
5	-4	+10	-9	-5	-4	+10	-11	-3	+6	+16	-10	0	+4	+16	-12	0
6	+1	+11	-3	-7	+2	+11	-4	-5	+8	+15	-5	-2	+12	+17	-5	0
7	+10	+9	+5	-4	+10	+13	+4	-7	+16	+14	+4	-2	+20	+17	+3	0
8	+20	+8	+12	0	+20	+9	+12	-1	+24	+12	+12	0	+26	+15	+11	0
9	+18	+7	+17	+4	+29	+9	+17	+3	+29	+11	+17	+1	+29	+13	+16	0
10	+31	+7	+18	+6	+32	+7	+19	+6	+29	+8	+18	+3	+27	+10	+17	0
11	+24	+6	+14	+3	+23	+4	+14	+3	+19	+5	+12	-2	+17	+6	+12	-1
12p	+2	+1	+1	0	+5	+1	+3	+1	+4	0	+4	0	+5	+1	+5	-1
1	-15	-1	-9	-5	-11	-1	-7	-3	-9	-4	-5	0	-6	-3	-3	0
2	-25	-3	-15	-7	-22	-3	-14	-3	-20	-6	-12	-2	-17	-6	-11	0
3	-24	-5	-15	-4	-25	-3	-17	-7	-27	-9	-16	-2	-26	-10	-16	0
4	-20	-7	-13	-4	-25	-8	-16	-1	-28	-12	-16	0	-30	-14	-16	0
5	-14	-9	-9	-3	-18	-10	-11	+3	-25	-16	-10	+1	-28	-16	-12	0
6	-7	-10	-3	+6	-9	-11	-4	+6	-17	-15	-5	+3	-22	-17	-5	0
7	0	-11	+5	+3	-2	-12	+4	+5	-9	-15	+4	+2	-14	-16	+3	-1
8	+4	-8	+12	0	-1	-9	+11	+1	-1	-13	+12	0	-5	-15	+11	-1
9	+5	-7	+17	-3	+5	-9	+17	-3	+4	-13	+17	0	+2	-14	+16	0
10	+4	-7	+18	-7	+5	-9	+14	-3	+6	-10	+18	-3	+6	-11	+17	0
11	+3	-7	+14	-4	+4	-3	+14	-7	+5	-5	+12	-2	+6	-6	+12	0
12	0	-1	+1	0	+1	-1	+3	-1	+3	-1	+4	0	+4	-1	+5	0
Hours.	May.				June.				July.				August.			
	$\Delta B.$	I.	II.	III.	$\Delta B.$	I.	II.	III.	$\Delta B.$	I.	II.	III.	$\Delta B.$	I.	II.	III.
12a	-1	-5	+4	0	-7	+6	+1	0	-6	+6	0	-1	-6	+5	0	0
1	-4	-1	-3	0	-4	-3	-1	0	-2	-2	0	0	-3	-1	-2	0
2	-7	+3	-9	-1	-7	+2	-7	-2	-5	+2	-6	-1	-6	+3	-8	-1
3	-8	+8	-14	-2	-8	+6	-22	-2	-5	+7	-11	-1	-6	+6	-11	-1
4	-4	+12	-15	-1	-5	+11	-14	-2	-2	+11	-13	0	-3	+12	-14	-1
5	+4	+15	-11	0	+3	+13	-11	-1	+3	+14	-12	+1	+4	+15	-11	0
6	+11	+17	-6	0	+13	+17	-6	-2	+11	+15	-7	+3	+14	+17	-5	+2
7	+22	+18	+3	+1	+20	+17	+1	+2	+19	+16	+1	+2	+20	+18	+1	+1
8	+27	+17	+10	0	+26	+17	+8	+1	+24	+17	+7	0	+26	+18	+8	0
9	+23	+15	+14	0	+29	+16	+13	0	+27	+15	+12	0	+28	+15	+13	0
10	+27	+14	+14	-1	+27	+15	+12	-2	+25	+10	+16	-1	+26	+11	+16	-1
11	+19	+11	+10	-2	+20	+11	+11	-3	+19	+9	+11	-1	+20	+10	+11	-1
12p	+9	+6	+4	-1	+11	+7	+6	-2	+11	+5	+6	0	+11	+7	+5	-1
1	-1	-2	-3	0	+2	-2	-1	+1	+2	-1	0	+1	-1	-1	-2	0
2	-11	-2	-9	0	-7	-2	-7	+2	-7	-2	-6	+3	-9	-3	-8	+2
3	-20	-7	-14	+1	-16	+12	-7	+2	-16	-7	-11	+2	-16	-6	-11	+1
4	-25	-10	-15	0	-22	-9	-14	+1	-23	-10	-13	0	-24	-10	-14	0
5	-26	-15	-11	0	-25	-14	-11	0	-26	-14	-12	0	-26	-15	-11	0
6	-22	-15	-6	-1	-25	-17	-6	-2	-24	-16	-7	-1	-24	-20	-5	-1
7	-17	-18	+3	-2	-19	-18	+1	-2	-18	-18	+1	-1	-18	-18	+1	-1
8	-8	-17	+10	-1	-11	-17	+8	-2	-10	-17	+7	0	-10	-17	+8	-1
9	-2	-16	+14	0	-3	-17	+13	+1	-3	-16	+12	+1	-3	-16	+13	0
10	+1	-13	+14	0	-1	-15	+14	+2	+6	-13	+16	+3	+1	-17	+16	+2
11	+1	-10	+10	+1	+2	-11	+11	+2	+2	-11	+11	+2	+1	-11	+11	+1
12	-1	-5	+4	0	0	-7	+6	+1	0	-6	+6	0	-1	-6	+5	0
Hours.	September.				October.				November.				December.			
	$\Delta B.$	I.	II.	III.	$\Delta B.$	I.	II.	III.	$\Delta B.$	I.	II.	III.	$\Delta B.$	I.	II.	III.
12a	0	-4	+5	-1	0	-3	+3	0	0	0	-1	+1	0	0	-1	+1
1	-2	0	-3	0	-3	+2	-7	+2	-2	+3	-9	+4	-2	+3	-10	+5
2	-5	+4	-10	-1	-5	+6	-13	-2	-5	+4	-14	-2	-4	+3	-14	+7
3	-6	+8	-15	+1	-5	+10	-16	+1	-5	+7	-15	+3	-5	+6	-15	+4
4	-3	+14	-17	0	-2	+13	-15	0	-4	+9	-13	0	-5	+9	-12	-2
5	+4	+15	-11	0	+4	+16	-10	-2	0	+12	-8	-4	-2	+10	-7	-5
6	+13	+17	-4	0	+12	+17	-3	-2	+7	+15	-2	-6	+4	+11	-1	-6
7	+21	+17	+4	0	+21	+17	+6	-2	+15	+11	+6	-2	+12	+9	+6	-3
8	+27	+18	+10	-1	+28	+16	+12	0	+24	+11	+12	+1	+21	+9	+11	+1
9	+30	+16	+14	0	+31	+13	+16	+2	+30	+9	+17	+4	+29	+8	+16	+5
10	+28	+12	+15	+1	+29	+11	+16	+2	+29	+7	+17	+5	+30	+6	+17	+7
11	+21	+8	+12	+1	+19	+8	+10	+1	+16	+3	+10	+3	+17	+3	+10	+4
12p	+10	+5	+5	0	+6	+3	+3	0	-2	-1	-1	0	-2	-1	-1	-2
1	-2	-1	-3	0	-10	-1	-7	-3	-15	-2	-9	-4	-17	-2	-10	-5
2	-14	-4	-10	0	-21	-6	-13	-2	-23	-3	-14	-6	-24	-4	-14	-6
3	-24	-9	-15	0	-27	-9	-16	-2	-25	-8	-15	-2	-24	-6	-15	-3
4	-31	-13	-17	-1	-28	-13	-15	0	-22	-10	-13	+1	-18	-7	-12	+1
5	-26	-15	-11	0	-23	-15	-10	+2	-16	-12	-8	+4	-11	-9	-7	+5
6	-21	-18	-4	+1	-17	-16	-3	+2	-10	-12	-2	+5	-5	-11	-1	+7
7	-13	-18	+4	+1	-10	-17	+6	+1	-3	-12	+6	+3	-1	-11	+6	-4
8	-8	-18	+10	0	-4	-15	+12	0	-1	-13	+12	0	+1	-8	+11	-2
9	-2	-16	+14	0	0	-14	+16	-2	+3	-10	+17	-4	+1	-8	+16	-5
10	+1	-14	+15	0	+2	-12	+16	-2	+4	-7	+17	-6	+3	-5	+17	-6
11	+2	-10	+12	0	+1	-7	+10	-2	+3	-5	+10	-2	+3	-8	+10	-3
12	0	-4	+5	-1	0	-3	+3	0	0	0	-1	+1	0	0	-1	+1

THE DIURNAL, SEMIDIURNAL, AND TRI-DIURNAL PRESSURE WAVES COMPUTED FROM THE SURFACE OBSERVATIONS.

We can obtain the three component pressure waves from the Weather Bureau observations by employing the data contained in Mr. P. C. Day's paper, prepared by direction of Brig. Gen. A. W. Greeley, "Diurnal Fluctuations of Atmospheric Pressure at twenty-nine selected stations in the United States, Washington, 1891." The tables give the local hourly corrections to the daily mean pressure; hence by changing the signs, we obtain ΔB , the variations of the pressure for each

hour, which are to be resolved into three harmonic components by the Fourier series. Five stations were selected which are naturally comparable with Blue Hill, being located at short distances above sea level, Boston, New York, Washington, Buffalo, and Cleveland. The mean variation at each hour was computed for these stations, and it appears in the column of the Table 1 marked ΔB , for each month of the year. In order that it might be learned whether the continental plateau stations produce the same results, the following stations, Bismarck, St. Louis, Dodge, Denver, and Salt Lake City, were computed in the same manner throughout the year. Since no

TABLE 2.—Diurnal, semidiurnal, and tri-diurnal temperature waves, on three planes. Unit = 1 degree Fahrenheit.

Hours.	195 meters.				400 meters.				1000 meters.				Sums.		
	$\Delta T.$	I.	II.	III.	$\Delta T.$	I.	II.	III.	$\Delta T.$	I.	II.	III.	I.	II.	III.
12a	+0.7	+1.7	-1.0	-0.6	-1.8	-0.5	-1.3	0.0	-3.4	-4.8	+0.6	+0.8	3.6	-1.7	+0.8
1	+1.5	+2.2	-0.9	+0.2	-2.0	+0.1	-1.9	-0.2	-3.9	-4.7	+0.4	+0.4	2.4	-2.4	+0.4
2	+2.0	+2.7	-0.8	+0.1	-1.9	+0.4	-2.1	-0.2	-4.1	-4.3	-0.2	0.0	1.2	-2.7	-0.1
3	+2.5	+3.0	-0.5	0.0	-1.3	+0.6	-1.8	-0.1	-3.8	-3.7	0.1	-0.2	0.1	-2.2	-0.3
4	+2.7	+3.1	-0.3	-0.1	+0.2	+1.4	-0.9	-0.3	-3.1	-3.2	+0.3	-0.2	1.3	-0.9	-0.6
5	+2.9	+2.9	-0.1	-0.1	+1.9	+1.4	-0.4	+0.1	-1.9	-2.1	0.2	0.0	2.2	0.7	0.0
6	+2.9	+2.5	+0.4	0.0	+3.0	+1.5	-1.3	+0.2	-0.6	-0.3	-0.1	+0.2	3.7	-1.6	+0.4
7	+2.8	+2.0	+0.8	0.0	+3.5	+1.5	-1.9	+0.1	+0.8	-0.4	-0.1	+0.5	3.9	-2.6	+0.6
8	+2.7	+1.5	+1.2	0.0	+3.6	+1.4	-2.2	0.0	+2.1	+1.3	0.0	+0.8	4.2	-3.4	+0.8
9	+1.8	+0.1	+1.5	+0.2	+3.2	+1.3	-2.1	-0.2	+3.0	+2.5	+0.1	+0.4	3.9	-3.7	+0.4
10	+0.4	-0.2	+0.5	+0.1	+2.2	+1.1	-1.3	-0.2	+3.6	+3.2	+0.4	0.0	4.1	-2.2	-0.1
11p	-1.3	-1.0	-0.3	0.0	+1.0	+0.9	-0.2	-0.1	+4.1	+3.9	+0.4	-0.2	3.8	-0.3	-0.3
12	-2.7	-1.6	-1.0	0.1	-0.8	-0.2	-1.3	0.3	+4.5	+4.1	-0.6				

TABLE 2.—Diurnal, semidiurnal, and tri-diurnal temperature waves—Cont'd.
APRIL.

Hours.	195 meters.				400 meters.				1000 meters.				Sums.		
	ΔT.	I.	II.	III.	ΔT.	I.	II.	III.	ΔT.	I.	II.	III.	I.	II.	III.
12 a.	+3.1	+4.8	-1.2	-0.6	+0.6	+2.1	-0.9	-0.6	-1.9	-1.7	0.0	-0.2	+5.2	-2.1	-1.3
1	+4.1	+5.6	-1.4	-0.1	+1.2	+2.7	-1.3	-0.2	-1.5	-1.7	-0.2	0.0	+6.6	-2.5	-0.3
2	+4.8	+6.0	-1.4	-0.2	+1.7	+3.3	-1.5	-0.1	-1.3	-1.6	-0.1	0.1	+7.7	-2.8	+0.2
3	+5.2	+6.1	-1.1	-0.2	+2.4	+2.8	-1.3	+0.9	-1.0	-1.2	-0.1	0.3	+7.7	-2.5	+1.4
4	+5.3	+5.7	-0.6	-0.2	+2.6	+3.1	-0.9	+0.4	-0.6	-0.9	-0.1	0.4	+7.9	-1.0	+1.0
5	+5.1	+4.9	+0.3	-0.1	+2.7	+2.7	-0.1	+0.1	-0.4	-0.5	-0.2	0.3	+7.1	0.0	+0.3
6	+4.5	+3.9	+0.8	-0.2	+2.6	+2.6	+0.2	-0.2	-0.1	-0.2	0.0	0.1	+6.3	+1.0	-0.3
7	+3.3	+2.5	+1.2	-0.4	+2.5	+1.9	+1.1	-0.5	+0.4	+0.3	+0.2	-0.1	+4.7	+2.5	-1.0
8	+1.8	+1.1	+1.2	-0.5	+2.0	+2.0	+0.6	-0.6	+0.9	+0.7	+0.4	-0.2	+3.8	+2.2	-1.3
9	+0.3	-0.6	+1.0	-0.1	+1.2	+1.3	+0.1	-0.2	+1.5	+0.9	+0.6	0.0	+1.6	+1.7	-0.3
10	-1.7	-2.2	+0.3	+0.2	-0.2	-0.3	+0.6	-0.1	-1.7	-1.2	+0.4	-0.1	-1.3	+1.3	-0.2
11	-3.6	-3.4	+0.4	+0.2	-0.9	-1.9	+0.1	+0.9	-1.8	-1.3	+0.2	0.3	-4.0	-0.1	+1.4
12 p.	-5.4	-4.4	-1.2	+0.2	-2.4	-1.9	-0.9	+0.4	-1.9	-1.5	0.0	0.0	-4.8	-2.1	+1.0
1	-6.9	-5.4	-1.4	-0.1	-3.8	-2.6	-1.3	-0.1	-1.8	-1.3	+0.2	0.3	-6.7	-2.5	+0.3
2	-7.5	-5.9	-1.4	-0.2	-4.6	-2.9	-1.5	-0.2	-1.4	-1.2	+0.1	-0.1	-7.6	-2.8	+0.3
3	-7.4	-5.9	-1.1	-0.4	-5.0	-3.2	-1.3	-0.3	-0.9	-1.1	-0.1	-0.1	-8.0	-2.5	+1.0
4	-6.5	-5.4	-0.6	-0.3	-4.4	-2.9	-0.9	-0.6	-0.4	-0.7	-0.1	-0.2	-7.6	-1.6	+1.3
5	-4.6	-4.8	+0.3	-0.1	-2.9	-2.6	-0.1	-0.2	0.0	-0.2	-0.2	0.6	-7.2	0.0	-0.3
6	-2.6	-3.6	+0.8	+0.2	-2.2	-2.3	+0.2	-0.1	-0.1	0.0	0.0	0.0	-5.9	+1.0	-0.2
7	-0.9	-2.3	+1.2	+0.2	-0.3	-1.7	+1.1	+0.9	0.0	-0.5	+0.2	0.3	-4.5	+2.5	-1.4
8	+0.6	-0.8	+1.2	+0.2	+0.9	-0.1	+0.6	-0.4	-0.1	-0.9	+0.4	-0.4	-1.8	+2.2	-1.0
9	+1.6	+0.7	+1.0	-0.1	+1.3	+1.1	+0.1	-0.1	-0.4	-1.3	+0.6	0.3	-0.5	+1.7	-0.3
10	+2.3	+2.2	+0.3	-0.2	+1.3	+0.9	+0.6	-0.2	-1.0	-1.5	+0.4	-0.1	+1.6	+1.3	-0.5
11	+2.8	+3.6	-0.4	-0.4	+1.0	+1.4	+0.1	-0.5	-1.5	-1.6	-0.2	-0.1	+3.4	-0.1	-1.0
12	+3.1	+4.8	-1.2	-0.6	+0.6	+2.1	-0.9	-0.6	-1.9	-1.7	0.0	-0.2	+5.2	-2.1	-1.3

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12 a.	+4.5	+5.3	-0.6	-0.2	-0.5	-0.2	-0.5	-0.2	-0.8	-0.7	-0.2	0.1	+4.4	-1.3	0.1
1	+4.6	+6.1	-1.0	-0.5	-0.7	0.3	-1.3	0.3	-0.8	-0.4	-0.5	0.1	+6.0	-2.8	-0.1
2	+4.7	+6.4	-1.3	-0.4	-0.9	0.6	-1.7	0.2	-0.8	-0.1	-0.8	0.1	+6.9	-3.8	-0.1
3	+4.8	+6.4	-1.3	-0.3	-0.8	1.1	-1.8	-0.1	-0.7	0.3	-1.0	0.0	+7.8	-4.1	-0.4
4	+4.8	+5.9	-1.0	-0.1	-0.5	1.2	-1.5	-0.2	-0.3	0.8	-1.0	0.1	+7.9	-3.5	-0.4
5	+4.5	+5.0	-0.5	0.0	-0.5	1.4	-0.7	-0.2	-0.6	1.1	-0.5	0.0	+7.5	-1.7	-0.2
6	+3.9	+4.7	-0.2	0.0	-1.6	1.3	0.4	-0.1	-1.4	-1.1	0.2	0.1	+7.1	0.8	0.0
7	+2.8	+2.3	-0.7	-0.2	-2.8	1.3	1.3	-0.2	-2.2	1.4	0.7	0.1	+5.0	+2.7	+0.1
8	+1.5	+0.7	-1.0	-0.2	-3.6	1.3	2.1	-0.2	-2.7	1.5	1.1	0.1	+3.5	+4.2	+0.1
9	-0.5	-0.9	-0.9	-0.5	-3.3	1.0	2.0	-0.3	-2.7	1.4	1.2	0.1	+1.5	+4.1	-0.1
10	-2.5	-2.5	-0.4	-0.4	-2.4	0.7	1.5	-0.2	-2.1	1.1	0.9	0.1	-0.7	+2.8	-0.1
11	-4.2	-3.1	-0.2	-0.3	-0.8	0.2	0.7	-0.1	-1.4	1.0	0.4	0.0	-1.9	+0.9	-0.4
12 p.	-5.6	-4.9	-0.6	-0.1	-0.5	0.2	0.5	-0.2	-0.5	0.8	-0.2	0.1	-3.9	-1.3	-0.4
1	-6.6	-5.5	-1.0	0.0	-1.8	0.8	-1.3	-0.2	-0.1	0.4	-0.5	0.6	-6.5	-2.8	-0.2
2	-7.2	-5.9	-1.3	0.0	-2.5	-0.7	-1.7	-0.1	-0.8	-0.1	-0.8	0.1	-6.7	-3.8	0.0
3	-7.3	-5.8	-1.3	-0.2	-2.8	-1.2	-1.8	-0.2	-1.2	0.3	-1.0	0.1	-7.3	-4.1	-0.1
4	-6.7	-5.5	-1.0	-0.2	-2.5	-1.2	-1.5	-0.2	-1.7	-0.8	-1.0	0.1	-7.5	-3.5	-0.1
5	-5.5	-4.5	-0.5	-0.5	-1.8	-1.4	-0.7	-0.3	-1.6	-1.2	-0.5	0.1	-7.1	-1.7	-0.1
6	-3.5	-3.3	-0.2	-0.4	-0.9	-1.5	0.4	-0.2	-1.1	-1.4	-0.2	0.1	-6.2	-0.8	-0.1
7	-1.5	-1.9	-0.7	-0.3	-0.2	-1.4	1.3	-0.1	-0.8	-1.5	-0.7	0.0	-4.3	+2.7	-0.4
8	+0.5	-1.4	-1.0	-0.1	0.5	-1.4	2.1	-0.2	-0.5	-1.5	-1.1	0.1	-4.8	-2.2	-0.4
9	+2.2	+1.3	-0.9	0.0	0.6	-1.2	2.0	-0.2	-0.4	-1.6	-1.2	0.0	-1.5	+4.1	-0.2
10	+3.2	+3.6	-0.4	0.0	0.5	-0.9	1.5	-0.1	-0.4	-1.4	-0.9	0.1	+1.3	+2.8	0.0
11	+3.9	+4.3	-0.2	-0.2	0.5	-0.4	0.7	-0.2	-0.6	-1.1	-0.4	0.1	+2.8	+0.9	+0.1
12	+4.5	+5.3	-0.6	-0.2	-0.5	-0.2	-0.5	-0.2	-0.8	-0.7	-0.2	0.1	+4.4	-1.3	+0.1

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12 a.	+4.2	+5.5	-0.6	-0.7	+1.7	+2.6	-0.3	-0.6	+1.4	+1.1	+0.5	-0.2	+9.2	-0.4	-1.5
1	+4.9	+5.7	-0.5	-0.3	+1.9	+3.2	-0.8	-0.5	+1.7	+1.5	+0.2	0.0	+10.4	-1.1	-0.8
2	+5.3	+6.7	-1.3	-0.1	+2.3	+3.5	-1.1	-0.1	+2.1	+2.2	-0.2	0.1	+12.4	-2.6	-0.1
3	+5.5	+6.8	-1.3	0.0	+2.6	+3.6	-1.3	-0.3	+2.4	+2.4	-0.4	0.4	+12.8	-3.0	-0.7
4	+5.3	+6.4	-1.2	-0.1	+2.7	+3.6	-1.3	-0.4	+2.4	+2.4	-0.5	0.5	+12.5	-3.0	-1.0
5	+4.9	+5.2	-0.5	-0.2	+2.8	+3.9	-1.3	-0.2	+2.4	+2.2	-0.3	0.5	+11.3	-2.1	-0.9
6	+3.9	+5.2	-0.1	-0.4	+2.7	+2.7	-0.1	-0.1	+2.3	+2.1	0.0	0.2	+8.0	-0.2	-0.3
7	+2.8	+2.9	-0.5	-0.6	+2.5	+1.8	-1.0	-0.3	+2.0	+1.6	0.4	0.0	+6.3	-1.9	-0.9
8	+1.3	+1.2	-0.8	-0.7	+1.7	+1.1	-1.2	-0.6	+1.4	+1.2	-0.4	-0.2	+3.5	-2.4	-1.5
9	+0.1	-0.4	-0.8	-0.3	+0.9	+1.3	-1.1	-0.5	+1.2	-0.4	0.8	0.0	+1.3	-2.7	-0.8
10	-1.8	-2.1	-0.4	-0.1	0.0	-0.7	-0.8	-0.1	-0.6	-0.1	0.6	-0.1	-2.9	-1.8	-0.1
11	-3.7	-3.8	-0.1	0.0	-1.1	-1.7	-0.3	-0.3	-0.2	-0.6	0.4	0.4	-6.1	-0.8	-0.7
12 p.	-5.3	-4.8	-0.6	-0.1	-2.3	-2.4	-0.3	-0.4	-0.4	-1.4	-0.5	-0.5	-8.6	-0.4	+1.0
1	-5.8	-5.5	-0.5	-0.2	-3.5	-2.9	-0.8	-0.2	-1.4	-2.1	-0.2	0.5	-10.5	-1.1	-0.9
2	-7.8	-6.1	-1.3	-0.4	-4.5	-3.3	-1.1	-0.1	-2.4	-2.4	-0.2	0.2	-11.8	-2.6	-0.3
3	-8.1	-6.2	-1.3	-0.6	-5.2	-3.6	-1.3	-0.3	-3.1	-2.7	-0.4	0.0	-12.5	-3.0	-0.9
4	-7.6	-5.7	-1.2	-0.7	-5.3	-3.4	-1.3	-0.6	-3.5	-2.8	-0.5	-0.2	-10.9	-3.0	-1.5
5	-5.8	-5.0	-0.5	-0.3	-4.3	-2.5	-1.3	-0.5	-3.0	-2.7	-0.3	0.0	-10.2	-2.1	-0.8
6	-3.8	-3.8	-0.1	-0.1	-2.5	-2.5	-0.1	-0.1	-2.3	-2.4	0.0	0.1	-8.7	-0.2	-0.1
7	-1.8	-2.3	-0.5	0.0	-0.5	-1.8	1.0	-0.3	-1.3	-2.1	0.4	0.4	-6.2	-1.9	-0.7
8	+0.2	-0.7	-0.8	-0.1	0.7	-0.9	1.2	-0.4	-0.6	-1.5	0.4	0.5	-3.1	-2.4	-1.0
9	+1.5	+0.5	-0.8	-0.2	1.3	0.0	1.1	-0.2	0.4	-0.9	0.8	0.5	-0.4	-2.7	-0.9
10	+2.6	+2.6	-0.4	-0.4	1.5	+0.8	0.8	-0.1	0.7	-0.1	0.6	-0.2	+3.3	-1.8	-0.3
11	+3.5	+3.0	-0.1	-0.6	+1.7	+1.7	-0.3	-0.3	+1.2	+0.8	-0.4	0.0	+5.5	-0.8	-0.9
12	+4.2	+5.5	-0.6	-0.7	+1.7	+2.6	-0.3	-0.6	+1.4	+1.1	+0.5	-0.2	+9.2	-0.4	-1.5

important differences exist between these two sets of stations, the plateau computation is not reproduced in this paper. The separation of the wave of ΔB into components was accomplished by the precepts,

$$\text{semidiurnal wave} = \text{II} = \frac{12a + 12p}{2}, \frac{1a + 1p}{2}, \text{etc.},$$

$$\text{tridiurnal wave} = \text{III} = \frac{12a + 8a + 4p}{3}, \frac{1a + 9a + 5p}{3}, \text{etc.},$$

$$\text{diurnal} = \text{I} = \Delta B - (\text{II} + \text{III}) \text{ at each hour.}$$

The pressure ΔB , Table 1, and the temperature ΔT , Table 2, were each computed in the same way. ΔB is given in units

TABLE 2.—Diurnal, semidiurnal, and tri-diurnal temperature waves—Cont'd.
JULY.

Hours.	195 Meters.				400 Meters.				1000 Meters.				Sums.		
	ΔT.	I.	II.	III.	ΔT.	I.	II.	III.	ΔT.	I.	II.	III.	I.	II.	III.
12 a.	+3.8	+5.2	-1.2	-0.2	+0.2	+0.8	-0.4	-0.2	0.0	+0.3	-0.1	-0.2	+6.3	-1.7	-0.6
1.	+4.5	+5.9	-1.4	0.0	+1.2	+1.5	-0.2	-0.1	+0.8	+0.8	-0.1	-0.1	+8.2	-1.5	-0.2
2.	+5.0	+6.3	-1.3	0.0	+2.1	+2.1	0.0	0.0	+1.6	+1.5	-0.2	-0.1	+9.9	-1.1	-0.1
3.	+5.2	+6.5	-1.2	0.0	+2.9	+2.6	-0.2	0.1	+2.3	+2.3	-0.1	-0.1	+11.4	-0.9	0.0
4.	+5.3	+6.2	-0.7	-0.2	+3.3	+3.1	-0.2	0.0	+2.8	+2.5	-0.2	0.1	+11.8	-0.3	-0.1
5.	+5.0	+5.3	-0.1	-0.2	+3.3	+3.0	-0.2	0.1	+2.8	+2.7	-0.1	-0.1	+11.0	0.0	+0.1
6.	+4.4	+4.4	-0.6	-0.3	+3.1	+2.9	-0.1	-0.1	+2.6	+2.7	-0.2	0.1	+10.0	+0.5	-0.4
7.	+3.5	+2.5	-1.3	-0.3	+2.8	+2.6	-0.1	-0.1	+2.4	+2.6	-0.2	0.0	+7.7	+1.2	-0.2
8.	+2.4	+1.2	-1.4	-0.2	+2.1	+2.4	-0.1	-0.2	+1.8	+2.2	-0.2	0.2	+5.8	-1.1	-0.6
9.	+0.7	-0.5	+1.2	0.0	+1.5	+1.5	-0.1	-0.1	+1.6	+1.5	-0.1	-0.1	+2.5	+1.4	-0.2
10.	-1.8	-1.6	-0.2	0.0	+0.7	+0.6	0.1	0.0	+0.8	+1.0	-0.1	-0.1	+0.0	-0.2	-0.1
11.	-4.1	-3.6	-0.5	0.0	0.0	-0.1	0.0	0.1	+0.2	+0.4	-0.1	-0.1	+3.3	-0.6	0.0
12 p.	-6.2	-4.8	-1.2	-0.2	-1.0	-0.6	-0.4	0.0	0.2	-0.2	-0.1	-0.1	+5.6	-1.7	-0.1
1.	-7.2	-5.6	-1.4	-0.2	-1.5	-1.4	-0.2	0.1	-0.7	-1.0	-0.1	-0.2	+8.0	-1.5	-0.1
2.	-7.6	-5.7	-1.3	-0.6	-2.1	-2.2	0.0	0.1	-1.4	-1.7	-0.2	0.1	+9.6	-1.1	-0.4
3.	-7.5	-6.0	-1.2	-0.3	-2.6	-2.9	-0.2	0.1	-2.1	-2.2	-0.1	0.0	+11.1	-0.9	-0.2
4.	-6.7	-5.8	-0.7	-0.2	-2.9	-2.9	-0.2	0.2	-2.4	-2.4	-0.2	-0.2	+11.1	-0.3	-0.6
5.	-5.2	-5.1	-0.1	0.0	-3.0	-3.1	-0.2	0.1	-2.9	-2.7	-0.1	-0.1	+10.9	-0.0	-0.2
6.	-3.2	-3.8	-0.6	0.0	-2.9	-3.0	-0.1	0.0	-2.9	-2.6	-0.2	-0.1	+9.4	+0.5	-0.1
7.	-1.0	-2.3	-1.3	0.0	-2.7	-2.9	-0.1	+1.1	-2.8	-2.5	-0.2	-0.1	+7.7	+1.2	0.0
8.	+0.4	-0.8	-1.4	-0.2	-2.2	-2.1	-0.1	0.0	-2.2	-2.1	-0.2	-0.1	+5.0	+1.1	-0.1
9.	+1.7	-0.7	-1.2	-0.2	-1.4	-1.6	-0.1	+0.1	-1.5	-1.8	-0.1	+0.2	+2.7	+1.4	-0.1
10.	+1.5	-2.3	-0.2	-0.6	-0.6	-0.8	-0.1	+0.1	-0.9	-0.9	-0.1	+0.1	+0.6	-0.2	-0.4
11.	+3.1	-3.9	-0.5	-0.3	0.0	-0.1	0.0	0.1	-0.3	-0.4	-0.1	0.0	+3.4	-0.6	-0.2
12.	+3.8	+5.2	-1.2	-0.2	+0.2	+0.8	-0.4	-0.2	0.0	+0.3	-0.1	-0.2	+6.3	-1.7	-0.6

TABLE 2.—Diurnal, semidiurnal, and tri-diurnal temperature waves—Cont'd.

OCTOBER.															
Hour.	195 meters.				400 meters.				1000 meters.				Sums.		
	ΔT .	I.	II.	III.	ΔT .	I.	II.	III.	ΔT .	I.	II.	III.	I.	II.	III.
12 a.	+1.6	+3.0	-1.2	-0.2	-1.3	-0.5	-0.8	0.0	-2.1	-1.5	-0.8	0.2	+1.0	-2.8	0.0
1.	+2.3	+3.7	-1.2	-0.2	-1.6	-0.6	-1.2	+0.2	-2.1	-1.5	-0.9	0.3	+1.6	-3.3	0.3
2.	+2.9	+3.8	-0.9	-0.0	-1.9	-0.7	-1.4	+0.2	-2.0	-1.4	-0.8	0.2	+1.7	-3.1	0.4
3.	+3.4	+4.0	-0.6	0.0	-1.8	-0.7	-1.2	0.1	-1.7	-1.2	-0.6	0.1	+2.1	-2.4	0.2
4.	+3.6	+3.4	-0.1	-0.1	-2.1	-0.7	-1.2	-0.2	-0.9	-1.0	0.0	0.1	+1.7	-1.1	0.0
5.	+3.5	+2.9	-0.6	0.0	-0.6	-0.6	-0.1	+0.1	0.0	-0.8	0.0	0.0	+1.5	-1.2	0.1
6.	+2.9	+2.1	-0.9	-0.1	-0.3	-0.4	-0.7	0.0	-0.6	-0.3	-0.9	0.0	+1.4	-2.5	-0.1
7.	+2.2	+1.5	-1.0	-0.3	-1.0	-0.3	-1.4	-0.1	-1.2	-0.1	-1.1	0.0	+1.3	-3.5	-0.4
8.	+1.1	-0.4	-0.9	-0.2	-1.7	0.0	-1.7	0.0	-1.7	-0.3	-1.2	-0.2	+0.7	-3.8	0.0
9.	-0.4	-0.6	-0.4	-0.2	-1.7	-0.1	-1.6	+0.2	-1.8	-0.5	-1.0	-0.2	+0.2	-3.0	0.3
10.	-1.6	-1.5	-0.1	0.0	-1.3	-0.2	-0.9	+0.2	-1.5	-1.0	-0.3	-0.2	+0.3	-1.1	0.4
11.	-3.2	-2.4	-0.8	0.0	-0.5	-0.6	-0.2	+0.1	-1.0	-1.3	-0.4	-0.1	+0.5	-1.4	0.2
12 p.	-4.0	-2.9	-1.2	-0.1	-0.3	-0.7	-0.8	-0.2	-0.5	-1.2	-0.8	0.1	+1.0	-2.8	0.0
1.	-4.6	-3.3	-1.3	0.0	-0.7	-0.4	-1.2	-0.1	-0.4	-1.1	-0.9	0.2	+1.8	-3.3	-0.1
2.	-4.6	-3.6	-0.9	-0.1	-0.8	-0.6	-1.4	0.0	-0.4	-1.2	-0.8	0.0	+1.8	-3.1	-0.1
3.	-4.4	-3.6	-0.6	-0.2	-0.6	-0.7	-1.2	-0.1	-0.5	-1.1	-0.6	0.0	+1.8	-2.4	-0.4
4.	-3.4	-2.3	-0.1	-0.2	-0.3	-0.9	-1.2	0.0	-0.9	-0.7	0.0	0.2	+1.7	-1.1	0.0
5.	-2.4	-3.8	-0.6	-0.2	-0.5	-0.4	-0.1	+0.2	-1.1	-0.2	-0.6	-0.2	+2.2	-1.2	0.3
6.	-1.2	-2.2	-0.9	-0.1	-1.1	-0.2	-0.7	-0.2	-1.1	-0.9	-0.9	-0.2	+2.0	-2.5	0.4
7.	-0.2	-1.2	-1.0	0.0	-1.7	-0.2	-1.4	-0.1	-0.9	-0.3	-1.1	-0.1	+1.3	-3.5	-0.2
8.	+0.6	-0.4	-0.9	-0.1	-1.7	-0.2	-1.7	-0.2	-0.7	-0.6	-1.2	-0.1	+0.8	-3.8	0.0
9.	+1.1	-0.7	-0.4	0.0	-1.5	-0.2	-1.6	+0.1	-1.1	-1.1	-1.0	-0.2	+0.6	-3.0	0.1
10.	+1.4	-1.6	-0.1	-0.1	-0.5	-0.4	-0.9	0.0	-0.9	-1.2	-0.3	0.0	+0.0	-1.1	-0.1
11.	+1.6	-2.7	-0.8	-0.3	-0.8	-0.5	-0.2	-0.1	-1.8	-1.4	-0.4	0.0	+0.8	-1.4	-0.4
12.	+1.6	+3.0	-1.2	-0.2	-1.3	-0.5	-0.8	0.0	-2.1	-1.5	-0.8	0.2	+1.0	-2.8	0.0
NOVEMBER.															
12 a.	+2.0	+2.8	-1.1	+0.3	-1.0	-1.1	-0.5	-0.6	-0.1	-0.1	-0.4	+0.4	+1.6	-2.0	+1.3
1.	+2.1	+3.4	-1.5	-0.2	-1.6	-1.2	-0.8	-0.4	-0.2	-0.1	-0.5	-0.4	+2.1	-2.8	-1.0
2.	+2.2	+3.6	-1.4	0.0	-1.9	-1.1	-0.8	0.0	-0.4	0.0	-0.5	-0.1	+2.5	-2.7	-0.1
3.	+2.4	+3.9	-1.2	-0.3	-2.0	-1.0	-0.7	-0.3	-0.6	-0.1	-0.4	-0.1	+2.8	-2.3	-0.7
4.	+2.8	+3.3	-0.4	-0.1	-2.0	-0.8	-0.5	-0.7	-0.7	0.0	-0.3	-0.4	+2.5	-1.2	-1.2
5.	+3.0	+3.6	-0.1	-0.5	-0.9	-0.6	-0.1	-0.4	-1.2	-0.1	-0.5	-0.6	+2.9	-0.8	-1.5
6.	+3.2	+2.9	-0.5	-0.2	-0.7	-0.2	-0.8	-0.1	-0.3	0.0	-0.3	0.0	+2.7	-1.6	-0.7
7.	+3.5	+2.2	-1.2	+0.1	-1.3	0.0	-1.1	-0.4	-0.8	0.0	-0.6	-0.2	+2.2	-2.9	-0.7
8.	+3.0	+1.2	-1.5	-0.3	-1.8	-0.3	-0.9	-0.6	-1.2	0.0	-0.8	-0.4	+1.5	-3.2	-1.3
9.	+1.8	-0.4	-1.2	-0.2	-1.7	-0.6	-0.7	-0.4	-1.0	0.0	-0.6	-0.4	+1.0	-2.5	-1.0
10.	-0.1	-0.7	-0.6	0.0	-1.0	-0.9	-0.1	0.0	-0.5	-0.2	-0.2	-0.1	+0.4	-0.9	+0.1
11.	-2.3	-1.6	-0.4	-0.3	-0.5	-1.1	-0.3	-0.3	0.0	-0.1	0.0	-0.1	+0.4	-0.7	-0.7
12 p.	-4.2	-3.0	-1.1	-0.1	-0.0	-1.2	-0.5	-0.7	-0.7	-0.1	-0.4	-0.4	+1.7	-2.0	-1.2
1.	-5.0	-3.0	-1.5	-0.5	-0.1	-1.3	-0.8	-0.4	-0.7	-0.4	-0.5	-0.6	+1.3	-2.8	-1.5
2.	-5.0	-3.4	-1.4	-0.2	-0.3	-1.0	-0.8	-0.1	-0.5	0.0	-0.5	0.0	+2.4	-2.7	-0.1
3.	-4.8	-3.7	-1.2	-0.1	-0.6	-0.9	-0.7	-0.4	-0.2	0.0	-0.4	-0.2	+2.8	-2.3	-0.7
4.	-4.0	-3.9	-0.4	-0.3	-1.0	-0.9	-0.5	-0.6	-0.2	-0.1	-0.3	-0.4	+2.9	-1.2	-1.3
5.	-3.2	-3.3	-0.1	-0.2	-1.0	-0.5	-0.1	-0.4	-0.3	-0.4	-0.5	-0.4	+2.4	-0.5	-1.0
6.	-2.2	-2.7	-0.5	0.0	-0.9	-0.1	-0.8	0.0	-0.3	-0.1	-0.3	-0.1	+2.7	-1.6	-0.1
7.	-1.1	-2.0	-1.2	-0.3	-0.6	-0.2	-1.1	-0.3	-0.3	-0.2	-0.6	-0.1	+2.4	-2.9	-0.7
8.	0.0	-1.4	-1.5	-0.1	0.0	-0.2	-0.9	-0.7	-0.3	-0.1	-0.8	-0.4	+1.7	-3.2	-1.2
9.	+0.6	-0.1	-1.2	-0.5	0.4	-0.7	-0.7	-0.4	+0.2	-0.2	-0.6	-0.6	+0.6	-2.5	-1.5
10.	+1.2	-0.8	-0.6	-0.3	-0.8	-1.0	-0.1	-0.1	+0.1	-0.1	-0.2	0.0	+0.3	-0.9	-0.1
11.	+1.6	-1.9	-0.4	+0.1	-1.0	-1.1	-0.3	-0.4	0.0	-0.2	0.0	-0.2	+0.6	-0.7	-0.7
12.	+2.0	+2.8	-1.1	+0.3	-1.0	-1.1	-0.5	-0.6	-0.1	-0.1	-0.4	+0.4	+1.6	-2.0	+1.3
DECEMBER.															
12 a.	+1.2	+1.8	-0.8	+0.2	-1.7	-2.4	+0.2	+0.5	+2.1	+2.4	0.0	-0.3	+1.8	-0.6	+0.4
1.	+1.3	+2.4	-1.3	-0.2	-2.0	-2.3	-0.1	-0.4	+2.3	+2.4	+0.2	-0.3	+2.5	-1.2	+0.3
2.	+1.5	+2.6	-1.3	-0.2	-2.1	-2.0	-0.2	-0.1	+2.4	+2.2	+0.3	-0.1	+2.8	-1.2	+0.2
3.	+1.9	+3.1	-1.1	-0.1	-2.1	-1.7	-0.3	-0.1	+2.2	+1.9	-0.3	0.0	+3.3	-1.1	-0.2
4.	+2.3	+3.3	-0.8	-0.2	-2.0	-1.3	-0.4	-0.3	+2.0	+1.5	-0.3	+0.2	+3.5	-0.9	-0.3
5.	+3.0	+3.2	0.0	-0.2	-0.9	-0.8	0.0	0.1	+1.3	+1.1	-0.1	-0.1	+3.5	-0.1	-0.2
6.	+3.2	+2.7	-0.6	-0.1	-0.2	-0.2	+0.2	+0.2	-0.1	-0.3	-0.3	-0.1	+2.8	-0.5	0.0
7.	+3.2	+2.1	-1.1	0.0	-1.2	-0.5	-0.4	+0.3	-1.2	-0.2	-0.6	-0.4	+2.4	-0.9	-0.1
8.	+3.1	+1.3	-1.6	+0.2	-1.0	-0.5	-0.5	-0.4	-1.7	-1.8	-0.6	-0.3	+1.5	-1.5	+0.4
9.	+2.4	+0.9	-1.3	+0.2	-2.2	-1.5	-0.5	-0.4	-2.0	-1.2	-0.5	-0.3	+1.0	-1.3	+0.3
10.	+1.1	0.0	-0.9	-0.2	-2.2	-1.7	-0.4	+0.1	-2.1	-1.7	-0.3	-0.1	+0.0	-1.0	+0.2
11.	-1.3	-1.0	-0.2	-0.1	-2.1	-2.0	-0.2	-0.1	-2.2	-2.0	-0.2	0.0	+1.0	-0.2	-0.2
12 p.	-2.8	-3.4	-0.8	-0.2	-2.0	-2.0	-0.2	-0.3	-2.1	-2.3	0.0	+0.2	+3.6	-0.6	-0.3
1.	-3.8	-4.9	-1.3	-0.2	-1.9	-2.1	-0.1	-0.1	-2.0	-2.3	+0.2	-0.1	+5.1	-1.2	-0.2
2.	-4.1	-5.3	-1.3	0.1	-1.8	-1.8	-0.2	+0.2	-1.9	-2.3	+0.3	-0.1	+3.8	-1.2	0.0
3.	-4.1	-5.2	-1.1	0.0	-1.6	-1.6	-0.3	+0.3	-1.7	-1.6	-0.3	-0.4	+3.2	-1.1	-0.1
4.	-3.8	-4.8	-0.8	-0.2	-1.3	-1.2	-0.4	+0.5	-1.4	-1.4	-0.3	-0.3	+5.0	-0.9	+0.4
5.	-3.0	-3.2	0.0	-0.2	-0.9	-0.5	0.0	+0.4	-1.1	-0.9	-0.1	-0.3	+3.6	+0.1	+0.3
6.	-2.0	-2.8	-0.6	+0.2	-1.0	-0.2	+0.2	+0.1	-0.5	-0.1	-0.3	-0.1	+3.1	+0.5	+0.2
7.	-1.0	-1.5	-0.6	-0.1	-0.4	-0.7	-0.4	-0.1	-0.1	-0.5	-0.6	0.0	+1.7	-0.9	-0.2
8.	0.0	-1.4	-1.6	-0.2	-1.0	-1.2	-0.5	-0.3	+0.6	-1.0	-0.6	+0.2	+1.6	-1.5	-0.3
9.	+0.2	-0.9	-1.3	-0.2	-1.2	-1.6	-0.5	-0.1	+1.1	-1.5	-0.5	-0.1	+1.0	-1.3	-0.2
10.	+0.6	-0.2	-0.9	-0.1	-1.5	-2.1	-0.4	+0.2	+1.6	-2.0	-0.3	-0.1	+0.1	-1.0	0.0
11.	+0.9	+1.1	-0.2	0.0	-1.8	-2.3	+0.2	+0.3	+1.8	-2.4	-0.2	-0.4	+1.2	-0.2	-0.1
12.	+1.2	+1.8	-0.8	+0.2	-1.7	-2.4	+0.2	+0.5	+2.1	+2.4	0.0	-0.3	+1.8	-0.6	+0.4

the year. The following characteristics of these waves may be noted.

Diurnal wave.—In January the amplitude, a_1 , is about 0.011 inch, and this increases to 0.018 in August, which seems to be the maximum. The phase of the maximum in January is at 6-7 a. m., and that of the minimum is at 6-7 in the evening. The morning maximum phase is, apparently, about one hour later, 7-8 a. m. in the summer, and the evening minimum phase is, also, one hour later, 7-8 p. m. Thus, there is a slight advance of one hour in the times of maximum and minimum in passing from the cold season, with the sun in the

Southern Hemisphere, to the warm season, with the sun in the Northern Hemisphere.

Semidiurnal wave.—The two maxima occur with remarkable steadiness at about 10 a. m. and 10 p. m. throughout the year, though they are a little later in the summer than in the winter. The minima occur at 3-4 a. m. and 3-4 p. m. in the winter, and about one hour later 4-5 a. m. and 4-5 p. m. in the summer. The ascending branch of the curve is, therefore, a little less inclined than the descending branch during the winter, but in summer they are quite symmetrical. The amplitude of the curve is about 0.018 in January and somewhat less in the summer, 0.014 in June, 0.015 in July.

Tri-diurnal wave.—There is much more fluctuation in this minor wave than in the two others just described. In December, January, and February the amplitude is about 0.006, with maxima at 2 a. m., 10 a. m., 6 p. m., and minima at 6 a. m., 2 p. m., 10 p. m. On the other hand, in the summer the amplitude is about one-third as great, 0.002, but the phase is reversed so that the maxima occur at 7 a. m., 3 p. m., 11 p. m., with the minima at 3 a. m., 11 a. m., 7 p. m. The change of phase appears to take place between March-April, August-September, so that the larger amplitude is developed while the sun is in the Southern Hemisphere, and the smaller while it is in the northern, the transition taking place at the equinoxes as the sun crosses the equator. This is the third instance in which an inversion phenomena has been detected in the earth's atmosphere, due the orbital solar action: (1) The inversion of the magnetic and meteorological elements as described in my Bulletin No. 21; (2) the inversion or surging of the atmosphere as to its temperature between the Tropics and the temperate zones, and as to its pressure between the Eastern and the Western hemispheres, as shown in the MONTHLY WEATHER REVIEW, November 1903; and (3) in the tri-diurnal pressure wave as exhibited in this paper. Whatever may be the causes of these phenomena of inversion it is evident that the mere interference of waves of different periods can not be the sole cause. The subject will require careful and exhaustive investigation of the numerous forces operating in the complex circulations of the solar and terrestrial atmospheres.

THE DIURNAL, SEMIDIURNAL, AND TRI-DIURNAL TEMPERATURE WAVES IN THE LOWER STRATA OF THE ATMOSPHERE.

An inspection of the temperature curves given in the preceding paper, MONTHLY WEATHER REVIEW, February, 1905, makes it evident that the temperature waves in the successive strata of the lower atmosphere differ very much from the wave observed at the surface. We may suppose that the pressure waves are closely connected with the temperature variations in the lower strata, and that the changes in the density produced by the variations in temperature become converted into pressure changes in part by thermodynamic processes. The subject is, of course, complex, and its final solution will require more detailed examination than it has been possible to make at this time. I have decided to execute a rough sort of integration of the entire temperature effect, by computing the components for the curves deduced on the planes at 195, 400, and 1000 meters elevation. The agreement between this result and the actual one existing in the atmosphere from the surface to 3400 meters can be only approximate, but the outcome serves to indicate that the temperature waves in the free air are the direct cause of the pressure waves as a density rather than as a dynamic effect. The temperatures on these three planes were scaled from the diagrams, each one was separated into its I, II, III components, and then the sums for each type on these three planes were computed. The details of this work are given in Table 2, since they are of general interest, and the second section of the diagrams under each month in figs. 26-37 gives the corresponding temperature curves. I repeat the statement, that for convenient comparison of the temperature

waves with the pressure waves the numerical signs have been reversed throughout the temperature computation.

Diurnal wave.—These temperature waves have been constructed without using the surface temperatures, and this implies that the temperatures in the several strata are chiefly concerned in generating the pressure waves that are observed at the respective elevations. Of course some additional influence must be expected to work in from the adjacent strata not here reckoned in the integration, and therefore the results here discussed do not exhaust the entire scope of the available sources of inquiry. A close approximation to a parallelism between the pressure and the temperature systems is certainly indicated. In January, February, and March the diurnal curves of temperature and pressure are in close agreement as to amplitude and phase, and reversing the sign of ΔT , we obtain the relation,

$$-4^{\circ} \Delta T \propto +0.010 \Delta B, \text{ or } -1^{\circ} F \propto +0.0025 \text{ inch.}$$

With the approach to summer the curve of temperature increases in amplitude more rapidly than the pressure curve, and the phase of maximum and of minimum in July and August is about three or four hours earlier, 4 a. m. for temperature and 7 a. m. for pressure, or 3:30 p. m. for temperature and 7:30 p. m. for pressure. The semidiurnal temperature waves are, however, smaller than would be expected and possibly I have not obtained exactly the correct temperature curves to resolve into components in these two months. We have an approximate relation,

$$-12^{\circ} \Delta T \propto +0.017 \Delta B, \text{ or } -1^{\circ} F \propto +0.0014 \text{ inch.}$$

It follows that in summer the influence of one degree of temperature to change the pressure is about one-half as much as it is in the winter. This implies a series of complex functions which it is not possible to discuss in this place.

Semidiurnal wave.—The most important fact brought out by this computation is that a true semidiurnal wave of temperature is developed in the lower strata whose phase for the maximum ordinate persists steadily throughout the year at 8 a. m. and 8 p. m., with the minimum at 2 a. m. and 2 p. m., except that in summer the minimum occurs about one hour earlier. Generally the temperature maxima precede the pressure maxima by about two hours, implying that the semidiurnal pressure wave follows the temperature wave at an interval of two hours throughout the year. In winter the amplitudes have nearly the following relation,

$$-3^{\circ} \Delta T \propto +0.018 \Delta B, \text{ or } -1^{\circ} F \propto +0.0030 \text{ inch,}$$

while in summer the relation is follows,

$$-2^{\circ} \Delta T \propto +0.015 \Delta B, \text{ or } -1^{\circ} F \propto +0.0075 \text{ inch.}$$

Hence, the temperature wave in summer is two and one-half times as effective in producing the pressure wave as it is in the winter. In considering the dynamic relations of these waves, it is necessary to bear in mind that the entire system is moving from east to west in the atmosphere, or from right to left in the diagram, and the relative position in the semidiurnal, as in the diurnal waves, is that the temperature waves precede the pressure waves. If a physical process is concerned, as the vertical movement of convectional currents with expanding heads, or the downward flow of cool air along the sides of the warm diurnal cone, then this time-lag of two hours represents the interval connecting the temperature cause with the pressure effect. It is, however, quite clear that the diurnal pressure waves have their origin in a temperature wave, rather than in a forced dynamic wave as suggested by Lord Kelvin.

Tridiurnal wave.—We shall divide the year into two portions for discussing the tridiurnal wave: first, October to March, and, second, April to September. In the winter period it is seen that a fair agreement exists in the phases of the maxima of the temperature and the pressure waves, and that, with the system of coordinates here employed, they are in approxi-

mately direct synchronism. In the summer months, on the other hand, although the correspondence between the two sets of curves is much less satisfactory, there is suggested a synchronism of the inverse type, such that the phases of the temperature and pressure are opposite to one another. It will hardly be safe to lay down more definite conclusions regarding these tridiurnal curves, because we should not only require to have for discussion very perfect original curves in the atmosphere, but also it would be necessary to integrate throughout the entire range in altitude—that is, through the strata of the atmosphere affected by the diurnal disturbance—instead of limiting our summation to three selected curves.

A further discussion of these curves in connection with the vapor tension, the electric potential gradient, the coefficient of dissipation, and the phenomena of atmospheric electricity generally will be found in the next paper of this series, while their relations to the diurnal variation of the earth's magnetic field will be taken up in a still later paper.

RECENT PAPERS BEARING ON METEOROLOGY.

By H. H. KIMBALL, Librarian and Climatologist.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the Library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau. Unsigned articles are indicated by a —

Science. New York. New Series. Vol. 21.

Rotch, A. Lawrence. The St. Petersburg conference on the exploration of the atmosphere. Pp. 461-465.

Barus, Carl. Radiation associated with X-rays. Pp. 551-566.

Chester, C. M. The total solar eclipse of August 29-30, 1905. Pp. 635-637.

Scientific American. New York. Vol. 92.

L. Some weather observations. P. 262.

Scientific American Supplement. New York. Vol. 59.

Poynting, J. H. Radiation pressure. P. 24435.

— Rain: its cause. Pp. 24474-24475.

— The Piesmic barometer. P. 24482.

— The structure of the atom. P. 24498.

Nature. London. Vol. 71.

Bryan, G. H. Progress in aerial navigation. Pp. 463-465.

— [Kite ascents made on the yacht of the Prince of Monaco in the Mediterranean and North Atlantic Ocean in the summer of 1904.]

[Note on work of H. Hergesell.] P. 467.

— Effect of autumnal rainfall upon wheat crops. Pp. 470-471.

Rotch, A. Lawrence. Inversions of temperature and humidity in anticyclones. Pp. 510-511.

Geographical Journal. London. Vol. 25.

Scott, Robert F. Results of the National Antarctic Expedition. [Climate.] Pp. 353-373.

Symons's Meteorological Magazine. London. Vol. 40.

— The rainfall of the six months, September, 1904-February, 1905. Pp. 21-25.

Dansey, R. P. The glacial snow of Ben Nevis. Pp. 29-32.

Harvey, C. Wigan. A quarter of a century's rainfall at Throcking, Herts. P. 32.

Burt, Theodore. Meteorological observations in Pemba during 1903 and 1904. Pp. 34-35.

Knowledge. London. New Series. Vol. 2.

Ingram, Beresford. "Ad Infinitum." The structure of the atom. Pp. 74-75.

MacDowall, Alex. B. Forecasting seasons. P. 80.

Science Abstracts. London. Vol. 8.

Ros[enhain], W. Manufacture of thermometer glass at Jena. [Abstract of report of E. Grieshammer.] P. 162.

B[aynes], R. E. Formula for gaseous diffusion. [Abstract of article of P. Langevin.] P. 163.

Ros[enhain], W. Thermometer glass and the annealing thermometers. [Abstract of article of G. Müller.] P. 176.

Scottish Geographical Magazine. Edinburgh. Vol. 21.

Brown, Rudmose. Argentine Antarctic station. Pp. 207-210.

Journal of Geography. New York. Vol. 4.

Kirchwey, Clara B. Laboratory work in physical geography in secondary schools. [Atmosphere.] Pp. 122-130.

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By H. H. KIMBALL, Librarian.

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SNOWFALL AND WATER EQUIVALENT.

By Prof. H. C. FRANKENFIELD.

While the extremely important influence of melting snows upon the spring floods has been always fully appreciated, no systematic attempts to accurately determine their effect were made by the Weather Bureau until the present spring. For several years past Mr. Charles A. Mixer, Resident Engineer of the Rumford Falls Power Company at Rumford Falls, Me., has made measurements of the water equivalent of the accumulated winter snow, and the results from 1899 to 1903, inclusive, were communicated in a very interesting paper that appeared in the MONTHLY WEATHER REVIEW for April, 1903.

No other reports of observations were received until March of this year, when Mr. J. L. Dean, of the Hollingsworth and Whitney Company, of Winslow, Me., and Special River Observer of the Weather Bureau, made two measurements in the birch and pine brush at Winslow. On March 1 the depth of snow in the brush was 32 inches and the water equivalent 8 inches. At the same time the depth of snow in the open was 18 inches. On March 15 the depth of snow in the brush was 27 inches and the water equivalent 7.5 inches; depth of snow in the open, 15 inches.

During the winter just ended nine stations in the watershed of the Red River of the North were equipped with apparatus for measuring accumulated snowfall and its water equivalent. Observations were made on Monday morning of each week and telegraphed to the district center at Moorhead, Minn., but the snowfall during the winter was so light that no results of value were obtained. However, observations will be

continued and the service extended as far as possible into the northern rivers, and particularly into the headwaters of mountain streams in the extreme West.

EARTHQUAKE OF MARCH 21, 1905.

By Prof. CHARLES F. MARVIN.

The table below contains the details of the record of an earthquake made on the Omori seismograph at the Weather Bureau, Washington, D. C., at 10 hrs., 59 mins., 32 secs., p. m. (seventy-fifth meridian time) of March 21, 1905.

The record was very clearly defined, and the waves were particularly simple and sinusoidal in character throughout. It appears that the preliminary tremors were of exceedingly long duration, especially as compared with the principal portion of the earthquake. If we had included a series of small waves of regular character which preceded the larger waves actually regarded as making up the principal portion, the duration of the latter might have been made about two minutes longer. However, the smaller waves seemed more properly to belong to the second preliminary tremors.

Earthquake of March 21, 1905, seventy-fifth meridian time.

	<i>h.</i>	<i>m.</i>	<i>s.</i>
First preliminary tremors began.....	10	59	32 p. m.
Second preliminary tremors began.....	11	12	42 p. m.
Principal portion began.....	11	24	06 p. m.
Principal portion ended.....	11	26	17 p. m.
End of earthquake (a. m., March 22).....	0	13	12 a. m.
Duration of first preliminary tremors.....	13 min.	12 sec.	
Duration of second preliminary tremors.....	11 "	24 "	
Duration of principal portion.....	2 "	11 "	
Whole duration of earthquake 1 hr. 13 "	40 "		
Average complete period of 5 long uniform waves, at beginning of second preliminary tremors.....			30 sec.
Average complete period of 8 uniform waves at end of second preliminary tremors.....			15.6 "
Average complete period of 7 uniform, strong waves, constituting the principal portion.....			15.6 "
Period of pendulum.....			28.0 "
Magnification of record.....			10 times.
Maximum double amplitude of actual north-south displacement of the earth at seismograph.....			0.35 mm.

The north and south component of horizontal motion only was recorded.

THE VARIATIONS IN ATMOSPHERIC TRANSPARENCY DURING 1902, 1903, AND 1904.

By HERBERT HARVEY KIMBALL, Librarian and Climatologist, U. S. Weather Bureau.

In the Proceedings of the Third Convention of Weather Bureau Officials, pp. 69-77,¹ are given some results of observations made by me on the quantity of solar radiation received at the surface of the earth, and on the polarization of blue sky light, during 1902, 1903, and 1904. In another column of the current REVIEW Miss R. A. Edwards has given a translation of E. Marchand's account of similar observations covering the same period, supplemented with observations of certain optical phenomena, and made at Pic du Midi and Bagnères, in the Pyrenees, France. A comparison of certain features of these two series of observations is of interest.

In the Pyrenees a diminution in the amount of solar radiation received at the earth's surface was noted at intervals after May 27, 1902. This diminution became permanent in January, 1903, at which time it amounted to 20 per cent of the normal radiation. It reached 50 per cent on the 21st and 22d of the following month, and was quite marked until August of that year, when it amounted to about 10 per cent, after which it

¹ Variations in Insolation and in the polarization of blue sky light during 1903 and 1904. By H. H. Kimball. (Proceedings of the Third Convention of Weather Bureau Officials at Peoria, Ill., September 20, 21, 22, 1904. Washington, 1904.

gradually diminished, but was noticeable at times up to the end of 1904.

The blueness of the sky suffered a diminution of three units, measured on a scale of 0 to 50.

In my paper above referred to it is stated that—

I was surprised at the small value of the solar radiation received at the surface of the earth during January, February, and March, 1903, but particularly during March.

Also furthermore,

From January, 1903, to March, 1904, inclusive, there was a marked deficiency in the radiation measurements as compared with similar measurements made by Mr. Harvey N. Davis at Providence, R. I., in 1892,² amounting in some months to as much as 30 per cent, and in others to less than half this amount.

Since these observations were not all made at one station, they are not strictly comparable; but since Providence, the most northern station, generally gave the largest radiation values, the diminution in radiation as measured in 1903 and 1904 can hardly be attributed to local conditions.

The observations with the Pickering polarimeter, made at Asheville and Black Mountain, N. C., from December, 1902, to March, 1903, inclusive, and at Washington, D. C., from May, 1903, to date, may be compared without considering the discrepancy due to latitude that applies to pyrheliometer observations, although local conditions must also have an effect upon polarimeter observations.

There is a wide variation in the polarization of blue sky light from day to day, even when no clouds are present. I have therefore selected the observations showing the maximum polarization for each month, for comparison in the following table:

Maximum percentage of polarization of blue sky light during each month at a point on the vertical circle passing through the sun, and 90° from the latter.

Month.	1902.	1903.	1904.	1905.	Month.	1902.	1903.	1904.	1905.
	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>		<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>
January.....	51.8	54.1	59.9		July.....		47.5	61.8	
February.....	53.2	51.6	55.6		August.....				
March.....	47.4	53.2	61.1		September.....		54.6	59.7	
April.....		53.0			October.....		54.6	64.7	
May.....	43.4	54.7			November.....		57.6		
June.....	37.6	58.9			December.....	55.7	52.6	62.9	

No observations for the months left blank.

Since in general the blueness of the sky and the amount of solar radiation measured at the surface of the earth are proportional to the percentage of polarization of the blue sky light, it is not difficult to trace in the above table the diminution in atmospheric transparency that became marked in the Pyrenees in January, 1903, continued until the following August, and has gradually become less noticeable since that date.

The observations here compared are but two series out of many that show a diminution in the transparency of the atmosphere during 1903, plausibly due to the presence of volcanic dust in the atmosphere. A summary of other observations may be found in my paper in the proceedings of the convention already referred to.

It is a strange coincidence that the observations at the Astrophysical Observatory of the Smithsonian Institution indicate that during 1903 and 1904 not only did the solar radiation suffer unusual absorption in the earth's atmosphere, but the absolute amount received at the outer surface of the earth's atmosphere was less than usual.³ Naturally the question arises as to the possible relation between these two phenomena. The bolometric observations to be made on Mount Wilson, Cal., during the coming summer, by Professor Langley and Mr. Abbot will no doubt shed much light on this subject.

² Observations on solar radiation with the Ångström pyrheliometer. Monthly Weather Review, June, 1903, Vol. XXXI, p. 275.

³ See Langley, S. P. On a possible variation of the solar radiation and its probable effect on terrestrial temperatures. (Astrophysical Journal, Chicago. Vol. 19. p. 305-321.)

Diminished transparency of the atmosphere for considerable periods is not unusual. The meteorological conditions are frequently such that during an entire month there will not be a single day with a clear sky. But where such a variety of observations show a turbid condition of the atmosphere for several successive months, and even on days when meteorological conditions are favorable for a clear sky, some other explanation is necessary. In the case under consideration this is supplied, as indicated by Marchand, by the great quantities of volcanic dust thrown out by the eruptions in the West Indies during May, 1902.

TWILIGHT GLOWS AND CONNECTED PHENOMENA OBSERVED IN 1902, 1903, AND 1904 IN THE PYRENEES.

By E. MARCHAND.

[Translated by Miss R. A. Edwards, from the *Annuaire de la Société Météorologique de France*, February 1903, p. 40-45.]

I will summarize here, very briefly, the observations made on these phenomena at Pic du Midi or at Bagnères, by my co-workers, Messrs. Ginot, Latreille, Dort, and myself, since the end of the year 1902; observations which have been communicated at different times to the Société Ramond, principally in the meetings of February 3, and April 7 and 12, 1904.

Three principal phenomena have been distinguished which can be attributed, nevertheless, to the same general cause, the presence of dust, or perhaps of extremely fine particles of ice, in the upper regions of the atmosphere, the dust coming probably from the great eruptions of the volcanoes of the Antilles in May, 1902. These three principal phenomena are: (a) twilight glows; (b) solar or lunar coronas; (c) diminution of solar radiation. And we shall have occasion to mention several others of less importance.

(a.) TWILIGHT GLOWS.

Two phases of this phenomenon may be distinguished; (1) The appearance, fifteen or sixteen minutes after sunset¹ of a first twilight segment, pink, purplish, or copper red, which lasts from twenty to twenty-five minutes and then disappears below the horizon, leaving but a more or less persistent band of red or orange. The phenomena are naturally reversed when one observes in the morning before sunrise. (2) The appearance, about fifteen minutes after the disappearance of the first segment, of a second segment, pink or copper red, occupying about the same position, and disappearing in the same manner, but remaining sometimes much longer than the first.

The first segment is not peculiar to the period 1902-1904, during which time it only became much more intense and much more brightly colored. It exists at all times but it was on July 31, 1902, that I found it for the first time at Pic du Midi of an abnormal intensity; an intensity which I observed afterwards at various dates, during August, September, and October; but it was not until the end of October that it attracted the attention of the public.

By observing carefully the angular maximum height of the summit of this colored segment (due to the reflection of the solar rays, tangential to the earth, on the dust of the upper atmosphere) and the corresponding hour, one may calculate the height of the dust above sea level; allowing for refraction, these calculations have given me rather variable numbers, comprised between 10 and 40 kilometers.

The second segment, also, usually exists; but it consists ordinarily of a faint white light and therefore generally passes unnoticed; since the month of October, 1902, it has frequently been of a pinkish tint or copper red, sometimes brilliant and contrasting strikingly with the rest of the sky, which, at this time is very dark.

¹ We have reference here to the astronomical sunset, which may differ somewhat from the real sunset. At Pic du Midi, the real sunset takes place from eight to thirteen minutes after the astronomical sunset, on account of the large depression, $1^{\circ} 42'$, of the sensible horizon.

It is this second segment, when it is colored, that constitutes always, for the public, the twilight glow; it is produced by the solar rays that undergo two reflections on the atmospheric dust.²

In other words, one may say that the sun itself is the source of light of the first segment, although it has already set at the place where one observes this segment; while the source of light of the second segment is the colored region of the first segment or horizontal band, which latter is in the horizon of that elevated point in the atmosphere where this second segment is produced.

After August, 1902, the first segment, with its brilliant coloring, was observed several times each month; the second segment was relatively rare and was produced only during groups of two, three, and four days, separated from each other by rather long intervals, sometimes of several months. We must conclude from this that the atmosphere has probably contained a large quantity of dust at a high elevation ever since the latter part of the year 1902, but that it was probably not always abundant enough or elevated enough to be able to produce the second segment.

However, the second phenomenon demands not only the presence of very elevated dust; it is also necessary that the atmosphere be clear to a great distance from the place of observation to the east, for the morning, or to the west, for the evening. This can not occur frequently; therefore, contrary to what certain authors think, the absence of this second segment does not prove the absence of atmospheric dust.

Moreover, other related phenomena, which I will briefly enumerate, go to prove, in their turn, that this abnormal dust has never been absent during two years.

(b.) SOLAR AND LUNAR CORONAS—ANTHELIA.

After examining carefully the notes that accompany our observations with the dynamic actinometer and which give exactly the condition of the sky about the sun,³ I find that the solar corona was clearly perceived for the first time at Bagnères and at Pic du Midi, July 26, 1902, that is, about two months and a half after the great eruptions at Martinique. But it was only beginning with the month of December of the same year that it was seen permanently around the sun, or around the moon during the night. It is still visible whenever the sun shows itself; however, it seemed less luminous in 1904 than during 1903.⁴

This corona is composed of a sort of circular white halo, immediately surrounding the sun, and whose exterior contour is slightly tinted with copper red or purplish pink. The coloration can be seen only by hiding the sun behind an obstacle somewhat distant from the eye, such as a tree, the summit of a house, etc.

The mean diameter of the colored ring, as measured very frequently at Bagnères or at Pic du Midi,⁵ was about 48° , varying from 46° to 50° , at the end of 1903; the width of this ring was at that time about 20° ; the outer diameter of the corona was about 70° . At the present time the mean diameter appears to be from 40° to 44° ; the measurement is difficult, however, especially at the present time, because the colored ring merges insensibly into the white halo of the interior, and into the blue sky of the exterior.

At the close of 1903, we frequently saw in the luminous halo

² I wish to state, in the beginning, that I describe always the phenomena visible in the evening; that the words first and second segment relate to the sunset; and that in the morning these phenomena occur in inverse order.

³ At Bagnères and at Pic du Midi, we take observations every three hours, daily, with a static actinometer and besides, when the state of the sky will permit, with a dynamic actinometer (of a system intermediate between those of Violle and of Crova).

⁴ The name Bishop's ring is often given to this corona.

⁵ For these measurements and for all those that may have to be made on the phenomena of atmospheric optics, I have devised a special graphometer, very easily used, very convenient, and very easy to construct.

some slight strise, analogous to the filaments of the cirrus, forming a sort of network and showing to the eye the appearance of a very fine dust, irregularly stratified and lighted; sometimes this same appearance of a dusty network was perceived also at the exterior of the corona, which appeared then much larger (its exterior diameter was, on certain days, 130° , while under ordinary conditions it was about 70°). Finally, I saw this dusty network over almost the whole extent of the sky. These phenomena were not produced in 1904.

In considering the corona as a phenomenon of diffraction caused by atmospheric dust, we find easily that the mean diameter of the particles of dust is about 2.6μ , or, in round numbers, three-thousandths of a millimeter.

But this corona is not the only phenomenon of diffraction produced by the so-called dust. I will mention another, which has not yet been described and which I observed in 1883 and 1884, at the same time as the Bishop's ring, soon after the terrible eruption of Krakatoa.⁶ This is an anthelion altogether analogous to those which are often produced on fogs or clouds at elevated stations, such as Pic du Midi, and to which the name "Specter of the Brocken" is often given.

This anthelion appears in the form of a faintly-colored purplish-pink or copper-red ring of the same diameter and the same width as the colored ring of the solar corona, but visible on the side opposite the sun, or to the east in the evening. I observed it rather frequently during January, February, and March, 1903, very rarely during the following months, and not once during the month of August of the same year.

Quite often the lower part only of the anthelion was visible. When this was the case, the phenomenon assumed the aspect of two columns of purplish light, about 50° apart, slightly curved toward each other (the upper part of the arc being absent) and resting on the pink band which ordinarily surmounts the shadow of the earth.

Finally, on the same dates, the horizon opposite the setting sun often shows over a large extent a faint purplish tint, which commences some minutes after sunset and continues for a variable length of time.

(c.) DIMINUTION OF SOLAR RADIATION.

According to the observations made with the dynamic actinometer as often as possible at the two stations of this observatory, it was on May 27, 1902 (that is to say, 20 days after the great eruptions of Mont Pelée), that the first appreciable diminution of the intensity of radiation was recorded, and that, too, simultaneously at Bagnères and at Pic du Midi, without any other apparent cause than the slightly vaporous (hazy) appearance of the sky in the neighborhood of the sun.⁷

But this diminution then ceased. It was observed from time to time during the following months, and became permanent in January, 1903; the diminution then amounted to about one-fifth of the average intensity of insolation that had obtained during preceding years at the same dates and under the same conditions as regards the height of the sun, the temperature, and the humidity.

On February 21 and 22, 1903, at Bagnères, this diminution attained one-half the normal value of the radiation. The atmosphere was then charged with a dust, hiding objects more than six or seven kilometers distant, and rising not more than 2800 meters on the 21st and 2500 meters on the 22d, according to observations taken at Pic du Midi. The comparison of the actinometric observations made at Bagnères and at Pic

du Midi during these and the preceding days appears to indicate that the particles of dust scattered in the higher regions of the atmosphere before February 20 fell little by little into the lower regions from the 20th to the 22d because of an exceptionally calm atmosphere. This dust, however, was visible at Bagnères in the form of light stratified clouds, analogous to the cirrus, on the 21st and 22d; at Pic du Midi the atmosphere was clear above 2500 meters and the solar radiation was less diminished. On the 22d and 23d at Bagnères the fall of this dust on the surface of certain zinc roofs was actually observed.

There was still considerable diminution of radiation during February, March, April, May, June, and July, 1903; in August the diminution still amounted to about one-tenth of the normal radiation, during the following months it became less without disappearing altogether; there were, however, some fluctuations. During the year 1904, the actinometer has sometimes given almost normal intensities, while on other days, without apparent cause, it has indicated an atmospheric absorption greater than normal by about one-tenth.

(d.) OTHER PHENOMENA.

I shall but mention some other phenomena resulting from the presence of dust in the atmosphere.

(1.) *Diminution of the intensity of the blue of the sky.*—This intensity is measured five times a day, at our two stations, by means of the Saussure cyanometer (scale of 0, white sky, to 50, black or blue-black sky); the diminution of this blueness was three units of the cyanometric scale at the end of 1902 and at the beginning of 1903.

(2.) *Green color of the moon.*—Very often during the same period of 1902–1903 the moon, as seen in a clear sky, had a characteristic greenish tint, and was surrounded by a luminous region of the same color, and outside of that by the halo or corona already described.

(3.) *Pink color of high clouds and of mountain summits.*—I have often observed that high clouds, whose altitudes are known by processes that we employ for this purpose, when located at the zenith, or even to the east of the zenith, were illuminated by a pinkish light a long time after sunset, as if they still received the rays of the sun; that is, as if they were from fifteen to twenty kilometers above the ground. The mountain summits visible from Bagnères (for example, the Peak of Arbizon, 2830 meters high), have sometimes been illuminated in the same way.⁸ In reality, this phenomenon is quite analogous to the second twilight segment; the rays that then reach these clouds have been reflected a first time;⁹ they are, by contrast with a very dark sky, lighted brilliantly by the light coming from the red band or from the first pink segment, which is in their own horizon.

General conclusions.—One may conclude, it seems, from the whole of our observations, that during two years very fine dust was scattered in the higher regions of our atmosphere; that above the Pyrenees this dust was never absent after the month of June, 1902; that the quantity and the altitude of the particles of dust have undergone rather large variations, but have, however, progressively diminished, and finally, that all the abnormal phenomena above described can be attributed to the presence of this dust.

As to the dust itself, it appears to have come from the Antilles, as that of 1883 came from the eruption of Krakatoa, and that of 1831 from the submarine volcano which produced the temporary island "Julia" in the Mediterranean.

It will not be useless to call attention to the fact that the various phenomena mentioned here were already described by the Observatoire du Pic du Midi, almost immediately after their appearance, in the Bulletin mensuel du Bureau Central

⁶In the month of December, 1883, I called the attention of the Académie des Sciences to the presence of this diffraction circle [i. e., the Bishop circle.—Ed.] and to its connection with the twilight glows of the preceding month. See Paris, C. R., 1883, xevii, p. 1514.

⁷Although the observers, Messrs. Ginot and Dort, did not note explicitly on this day the presence of a corona around the sun, but only a light vapor or mist in the neighborhood of the sun, it is probable that the corona already existed.

⁸I had made the same observations on the Alps (especially on Mont-Blanc), and at the Observatory of Lyons in 1883 and 1884.

⁹[By the air and vapor and dust.—C. A.]

Météorologique du France, viz, the twilight glows in October, 1902, the solar and lunar corona and diminution of radiation in December, 1902, and January, 1903. It is, then, surprising that various scientists, describing them in their turn some months later, or summarizing in 1904 the observations made at various places, have appeared to ignore completely the indications given in an official organ for French meteorology.

These indications were, it is true, very brief, as are those that I have just given, and it would certainly be interesting to publish our observations a little more in detail, as I hope to do soon.

But I desire now to point out the difference of intensity which exists, according to my observations, between the phenomena of 1883-1884 and those of 1902-1903. In 1883 (I then observed at Lyons), the twilight glows (the second segment) were more luminous and more prolonged, and the diffraction circles coronæ or anthelia, were much more brilliant and easy to see than in 1903.

THE SOLAR ECLIPSE OF AUGUST 30, 1905, AS VISIBLE IN THE UNITED STATES.

By WILLIAM FRANCIS RIGGE, S. J., Creighton University, Omaha, Nebr.

The solar eclipse of August 30, 1905, will, as is well known, be a total eclipse. But as the path of totality begins just outside of the United States, the eclipse becomes for us a partial one and occurs near the time of sunrise. A map of this eclipse specially constructed for the United States and showing

the varied degrees of obscuration attained in the different States, will, therefore, I trust, be of interest to the reader, and it is accordingly given herewith. (See Fig. 1). This eclipse map was constructed graphically according to the method explained by the writer in Popular Astronomy Nos. 32, 33, 34, of August, September, and October, 1896.

A great part of the sunrise oval lies across the United States. Its eastern branch entitled "Eclipse begins at Sunrise," its middle line showing the "Middle of the Eclipse at Sunrise," and its western branch on which the "Eclipse ends at Sunrise," are sufficiently intelligible not to need any explanation. The smaller ovals marked 2, 4, 6, 8, show the even tenths of obscuration, that is, of the sun's diameter obscured, at the moments of sunrise. For example, all along the oval 6 the sun rises six-tenths eclipsed, along the eastern branch of this oval the eclipse is increasing and along the western branch decreasing at this moment.

The system of lines approximately at right-angles to the middle of the eclipse line denotes every tenth of obscuration for the middle of the eclipse, or, in other words, the maximum obscuration.

A couple of examples will illustrate the use of the eclipse map. At Cincinnati, Ohio, the sun rises with an obscuration of 0.50, and this increases to 0.67. At Omaha, Nebr., the obscuration at sunrise is 0.56 and is diminishing.

The dotted lines marked V, VI, VII, at the bottom of the map, show the places at which sunrise occurs at 5, 6, 7, o'clock, central time. C is the point of first contact.

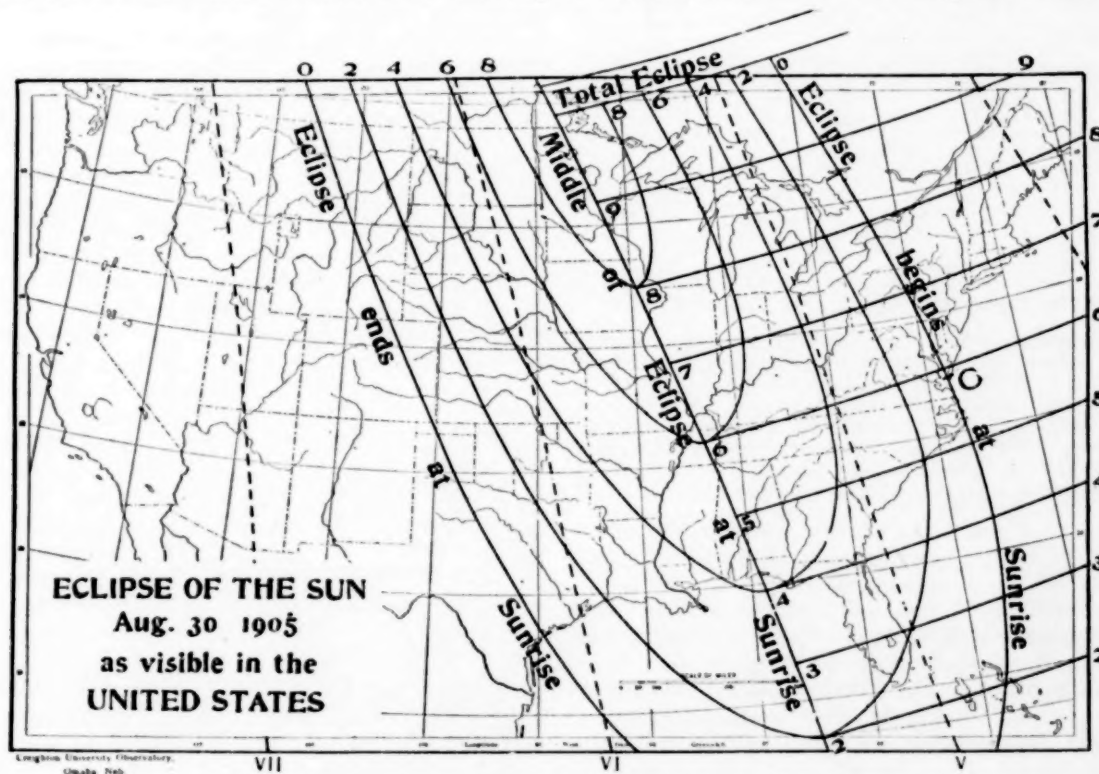


FIG. 1.—Map showing the degrees of obscuration in the different States.

NOTES AND EXTRACTS.

TORNADO NEAR BLUFF SPRINGS, FLA., MARCH 20, 1905.

Mr. William F. Reed, jr., observer at Pensacola, submits a report of a tornado near Bluff Springs, about 40 miles north of Pensacola, early in the morning of March 20. The morning weather map of that date shows an area of low pressure central near Meridian, Miss., with thunderstorms at Pensacola, Mobile, Meridian, Montgomery, and Nashville, and the follow-

ing heavy rainfalls were reported: Mobile, Ala., 9.20 inches; New Orleans, La., 5.48; Birmingham, Ala., 1.76; Montgomery, Ala., 1.50; Pensacola, Fla., 1.84; Nashville, Tenn., 1.16; Corpus Christi, Tex., 1.06.

Owing to the hour of occurrence, 4 a. m., and its brief duration, the storm was not generally noticed, so far as known. Mr. G. M. Gentry, whose residence was in the path of the storm, furnishes the accompanying sketch, fig. 1, showing

that portion of township 5, range 31, in which the tornado occurred. All of the houses shown were more or less damaged. Mr. Gentry states that the storm track was about two and one half miles in length, and about half a mile in width at his place.

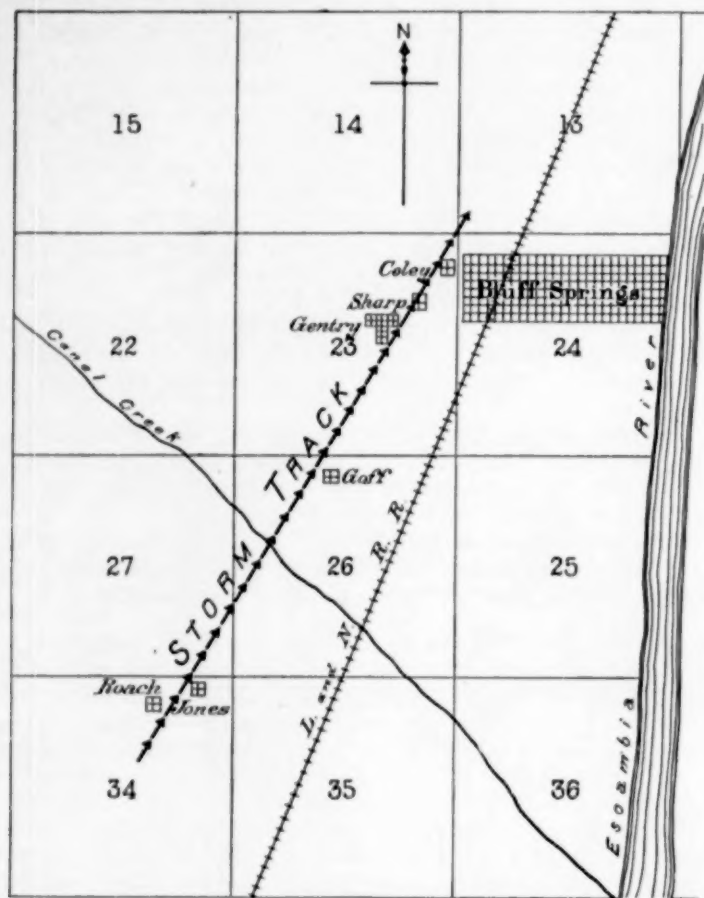


FIG. 1.—Track of tornado near Bluff Springs, Fla., March 20, 1905.

Looking over its pathway, I find that trees fell in every direction, tops lying every way; shade and fruit trees were uprooted and twisted off; in the woodland they were twisted and broken off. The debris shows plainly the whirling motion, and seems to extend to the outer edges of the storm's pathway. The wind that did the damage was just a puff of a few minutes. The lightning was terrific, and the thunder just a solid roar. No hail was noticed and the rainfall was less than one inch. I hear there was considerable damage across the river in Santa Rosa County.

WEATHER BUREAU BULLETINS WANTED.

Any one having copies of the following bulletins, that he can spare, will confer a favor by forwarding them to the Library of the U. S. Weather Bureau, Washington, D. C.:

- No. 23. Hammon, William H. Frost: When to Expect it and How to Lessen the Injury Therefrom. 1899.
- No. 29. McAdie, Alexander G. Frost Fighting. 1900.

WEATHER BUREAU MEN AS INSTRUCTORS.

Mr. Alexander McC. Ashley, Section Director, Honolulu, H. I., on March 17 addressed the Research Club of Honolulu on "Weather Bureau Methods and Instruments." The subject was treated in a popular manner, the chief aim being to describe clearly the various lines of work now being carried on by the Bureau.

Mr. Joseph L. Cline, Observer, Corpus Christi, Tex., whose appointment as instructor in meteorology in the high school of that city has already been mentioned, has been giving one lecture each week during the last four months to the student, at the office of the Weather Bureau. These lectures on meteorology have included climatology, the effects of climate on plant growth and the human organism, and the applications of physics, thermodynamics, and hydrodynamics in general to the problems of the atmosphere. Mr. Cline prefers to emphasize the connection of meteorology with physics rather than to teach the subject as a branch of physical geography.

Mr. Norman B. Conger, Inspector, Detroit, Mich., reports that a number of classes from the central and eastern high schools came to the office at different times during March and were instructed in meteorological subjects. The classes in physical geography frequently come to the office at different periods and are addressed either by Mr. Conger or by Mr. C. D. C. Thompson.

Prof. Henry J. Cox, Chicago, Ill., lectured during March before the following associations:

- March 15. Steel Works Scientific Club, Joliet, Ill.
- March 16. Paint and Oil Association, Chicago, Ill.
- March 24. Society of Sons of the American Revolution, Chicago, Ill.
- March 27. Men's Club of Fullerton Avenue Church, Chicago, Ill.
- March 28. Men's League of Eggleston Baptist Church, Chicago, Ill.

Much interest is taken in these lectures, which are devoted to the general subject of weather and weather forecasting.

Mr. William M. Dudley, Observer, Scranton, Pa., reports that 135 pupils from the schools of that city, including the Dunmore and Scranton high schools and the Young Men's Christian Association class in physics, visited the office on six different occasions during March. Mr. F. A. Magrum, Assistant Observer, explained to them the movement of storms, the work of the Weather Bureau, and the construction and use of instruments.

Mr. William F. Reed, jr., Observer, Pensacola, Fla., reports that classes from the high school visited the office on March 14, 16, and 17, and received instruction in meteorology. In explaining the anemometer and sunshine recorder, practical demonstrations were given by placing the extra instruments in circuit with a battery and single register. Mr. Reed also lectured at the high school on the following dates:

- March 2, on "The Atmosphere; its Elasticity, Composition, Pressure, and Height."
- March 24, on "Climate." Drawings enlarged from textbook diagrams were used for illustration.
- March 28, on "Winds and Storms."

Mr. J. Warren Smith, Section Director, Columbus, Ohio, reports giving an illustrated lecture on March 9 before the Young Men's Christian Association of Columbus; a short address on "The Weather Bureau and the Telephone," on March 30; and a popular lecture on "Meteorology," April 28. His regular course of instruction in meteorology at the Ohio State University begins on April 6, and over thirty students have registered for this course.

THE WEATHER OF THE MONTH.

By Mr. P. C. DAY, Acting Chief, Division of Meteorological Records.

PRESSURE.

The distribution of mean atmospheric pressure is graphically shown on Chart VIII and the average values and departures from normal are shown in Tables I and V.

The most noticeable feature of the month was the extent to which changes in the distribution of atmospheric pressure dominated the weather conditions.

The winter type of high pressure that had persisted over the central valleys with prevailing northerly winds and corresponding cold weather over the entire region east of the Rocky Mountains during January and February, gave way rapidly during the current month. The area of high pressure was transferred far to the east, and marked decrease in mean pressure occurred over all districts except on the New England and south Pacific coasts.

Under normal conditions the pressure during March is relatively high over the South Atlantic and east Gulf States, over the upper Missouri and Red River of the North valleys, and along the middle and south Pacific coasts.

During March, 1905, the eastern high area covered the entire Atlantic coast districts, with averages from .05 to .14 inch above the normal. The high area, normal over the Dakotas, had practically disappeared, while on the Pacific coast the usual high area was much reduced in intensity, averaging from .05 to .10 inch below normal.

The normal decrease in pressure from February to March is remarkably uniform, only small areas showing less than .05 inch and nowhere does it exceed .10 inch decrease.

During the current month the changes in pressure assumed marked proportions, and over the entire region from the Mississippi Valley to the Rocky Mountains the changes were from .15 to .25 inch greater than the average.

There was a slight increase in pressure from the New England coast northeastward over the Canadian Maritime Provinces and into the North Atlantic Ocean, and along the immediate south Pacific coast.

As a sequence to the changes in the positions and intensities of the high areas and the consequent reduction of pressure to the northward, the prevailing wind directions were diverted from their normal north to west origin and consequent cold, to southerly and easterly winds with corresponding warmth.

TEMPERATURE OF THE AIR.

Unlike the preceding months of January and February, the temperatures during March, 1905, were above the normal over the entire country, except along the coast of Maine, about the eastern end of Lake Ontario, and at El Paso, Tex., and Phoenix, Ariz., where slight deficiencies were shown.

Under the influence of the prevailing warm easterly and southerly winds the isotherms of mean temperature, especially over the Missouri Valley region and extending into the Canadian Northwest Territories, were deflected far to the northward of their normal positions. Temperatures over this region averaged from 10° to 18° daily above the normal, while over the remainder of the country, except at a few scattered points, the temperature averaged from 2° to 8° above the normal.

It is doubtful if any preceding March within the history of weather observations showed thermal conditions so universally above the normal values, extending over practically the entire United States and northward into Canada as far as the field of observation extends.

During the first half of the month temperatures were low over New England, the Middle Atlantic States, and Lake region.

Over the South Atlantic and Gulf States, the Mississippi and Missouri valleys the period from the 10th to the 15th was generally colder than the average, while over the region between the Rocky and Sierra mountains the latter half of the

month was generally colder than the average. On the Pacific coast the last five days were decidedly cold.

No severe cold waves occurred during the month, nor were the minimum temperature records broken at any point. The maximum temperatures over the region east of the Rocky Mountains occurred generally from the 27th to the 29th, and over the lower Lake region, New York, and Pennsylvania temperatures higher than for any preceding March were recorded. At Rochester and Buffalo, N. Y., the maximum temperatures for the month were 9° and 5°, respectively, higher than any previous record.

Over portions of northern Texas, Arkansas, Missouri, Iowa, South Dakota, Nebraska, Kansas, and Oklahoma the mean temperatures for the current month were the highest on record.

The average temperatures for the several geographic districts and the departures from the normal values are shown in the following table:

Average temperatures and departures from normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	8	32.8	+ 0.9	- 8.1	-2.7
Middle Atlantic	12	42.2	+ 3.0	- 8.8	-2.9
South Atlantic	10	57.4	+ 3.8	- 9.1	-3.0
Florida Peninsula*	8	68.6	+ 3.1	- 2.3	-0.8
East Gulf	9	61.9	+ 4.7	-11.2	-3.7
West Gulf	11	62.4	+ 4.6	- 9.9	-3.3
Ohio Valley and Tennessee	8	50.3	+ 5.6	-10.5	-3.5
Lower Lake	8	35.9	+ 3.6	- 8.8	-2.9
Upper Lake	10	30.1	+ 3.4	- 5.5	-1.8
North Dakota*	8	33.1	+13.1	+ 9.4	+3.1
Upper Mississippi Valley	11	43.4	+ 7.5	- 6.8	-2.3
Missouri Valley	11	45.2	+ 9.9	- 3.2	-1.1
Northern Slope	7	39.7	+ 7.9	+ 4.2	+1.4
Middle Slope	6	49.4	+ 7.4	- 5.9	-2.0
Southern Slope*	6	55.0	+ 4.6	-11.3	-3.8
Southern Plateau*	13	50.2	+ 1.3	+ 5.0	+1.7
Middle Plateau*	8	42.1	+ 3.9	+ 8.7	+2.9
Northern Plateau*	12	45.0	+ 5.6	+ 8.7	+2.9
North Pacific	7	48.9	+ 3.8	+ 8.1	+2.7
Middle Pacific	5	55.7	+ 2.8	+ 8.6	+2.9
South Pacific	4	58.5	+ 3.0	+10.8	+3.6

* Regular Weather Bureau and selected cooperative stations.

In Canada.—Prof. R. F. Stupart says:

* * * The positive departures in Manitoba and the Northwest Territories were phenomenal, ranging from 11° at Winnipeg and Calgary to 16° at Swift Current and Qu'Appelle and 18° at Battleford. In British Columbia the positive departure was from 5° to 8°.

PRECIPITATION.

The distribution of total monthly precipitation is shown on Chart III.

The precipitation was in excess of the normal along the east and south Florida coasts, and the Gulf coast from Alabama westward, over the greater portion of Texas and northward over Oklahoma, Kansas, Nebraska, and Colorado. Over portions of this region the excess above the normal amounted to over 2.0 inches.

Phenomenally heavy rains also occurred over southern California, Arizona, and New Mexico; at Los Angeles, Cal., the excess amounted to over 3.0 inches, and at Yuma, Ariz., the amount recorded, 3.33 inches, is the largest monthly fall recorded at that station since the beginning of observations in 1875.

Over New England, the Middle and South Atlantic States, the greater part of the east Gulf States, the Mississippi Valley, and the lower Lake region the precipitation was generally less than the average.

Over southwestern Virginia, western North Carolina, the northern and central parts of South Carolina, Georgia, and Alabama, eastern Mississippi, and eastern Tennessee the precipitation was markedly deficient, averaging from 2.0 to 4.0 inches below the normal.

While the rainfall was deficient in amount over practically all the section east of the Mississippi River the distribution during the month was such that no serious drought conditions existed. Light showers prevailed at frequent intervals throughout the month in the Lake regions, the upper Mississippi and Missouri valleys, and the northern and central slope regions.

Well defined periods of rainfall occurred over the Gulf and Atlantic coast States from the 6th to the 10th, and from the 15th to the end of the month light showers were frequent. Over the Ohio Valley heavy rains were general from the 6th to the 9th, and frequent light showers from the 18th to the end of the month. Over the southern Plateau showers were of nearly daily occurrence from the 1st to the 20th, and over the middle and northern Plateau, and north and middle Pacific regions, from the 11th to the end of the month.

In southern California rains were general from the 11th to the 19th and on the 29th and 30th.

The snowfall was generally light, except over the southern Rocky Mountain region, where much more than the average amounts occurred.

At the end of the month no snow remained on the ground except in northern Maine, the Upper Michigan Peninsula, and at high and protected points in the Rocky and Sierra mountains.

Average precipitation and departure from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		Inches.	Inches.
New England.....	8	2.39	65	-1.3	-2.8
Middle Atlantic.....	12	3.06	79	-0.8	-1.6
South Atlantic.....	10	2.91	66	-1.5	-2.4
Florida Peninsula.....	8	4.91	169	+2.0	0.0
East Gulf.....	9	4.45	72	-1.7	+0.9
West Gulf.....	7	3.40	100	0.0	-1.0
Ohio Valley and Tennessee.....	11	3.77	88	-0.5	-3.6
Lower Lake.....	8	1.53	53	-1.2	-2.2
Upper Lake.....	10	2.46	114	+0.3	-0.9
North Dakota.....	8	0.65	77	-0.2	-0.7
Upper Mississippi Valley.....	11	1.78	78	-0.5	-1.5
Missouri Valley.....	11	2.12	116	+0.3	+0.2
Northern Slope.....	7	0.95	112	+0.1	-0.3
Middle Slope.....	6	2.71	207	+1.4	+1.5
Southern Slope.....	6	3.11	308	+2.1	+2.3
Southern Plateau.....	13	2.79	313	+1.9	+4.5
Middle Plateau.....	8	2.01	153	+0.7	+0.7
Northern Plateau.....	12	1.79	120	+0.3	-1.3
North Pacific.....	7	5.21	160	0.0	-4.3
Middle Pacific.....	5	5.00	132	+1.2	-1.0
South Pacific.....	4	3.80	173	+1.6	+3.2

* Regular Weather Bureau and selected cooperative stations.

In Canada.—Professor Stupart says:

The precipitation was above the average amount in many parts of Manitoba, and more locally over the lower mainland of British Columbia; elsewhere it was below the average. The positive departures nowhere appear to have exceeded one inch, whereas the negative departures were very marked in all districts. In Ontario, Toronto, was two inches below the average amount; Kingston and Ottawa, an inch and a half. In Quebec the deficiency was very generally an inch and three quarters, in the Maritime Provinces from two to nearly four inches, in many portions of the Northwest Territories three quarters of an inch, and in the interior of British Columbia about half an inch. The absence of snow was remarkable; no heavy snowstorms occurred anywhere, the most pronounced being the storm in Manitoba on the 28th, when the fall was from four to five inches, and the storm in Alberta on the 30th, when four inches were recorded locally.

At the close of the month over the whole of the Dominion the ground was nearly bare of snow, except in isolated localities, these being more especially in a few parts of Quebec and the Maritime Provinces. There was also snow still in the woods in parts of Ontario. In British Columbia little or no snow was reported on the mountains.

HUMIDITY.

The month as a whole was above the average as to relative humidity, most districts showing an excess above the normal. Over the southern Rocky Mountain region, Arizona, and southern California the average was far exceeded.

The averages by districts appear in the following table:

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England.....	73	- 2	Missouri Valley.....	70	- 2
Middle Atlantic.....	74	+ 2	Northern Slope.....	68	+ 1
South Atlantic.....	76	+ 1	Middle Slope.....	68	+ 8
Florida Peninsula.....	80	+ 3	Southern Slope.....	66	+11
East Gulf.....	75	+ 2	Southern Plateau.....	61	+22
West Gulf.....	73	+ 2	Middle Plateau.....	63	+ 5
Ohio Valley and Tennessee.....	69	- 2	Northern Plateau.....	65	- 1
Lower Lake.....	77	+ 1	North Pacific.....	79	+ 1
Upper Lake.....	82	+ 3	Middle Pacific.....	75	+ 1
North Dakota.....	74	- 4	South Pacific.....	75	+ 4
Upper Mississippi Valley.....	77	+ 4			

CLEAR SKY AND CLOUDINESS.

With the increase in relative humidity the average cloudiness was also augmented, and most districts showed material increases in both the average amount of clouds and days with rainfall.

The distribution of clear sky is graphically shown on Chart IV, and the numerical values of average daylight cloudiness, both for individual stations and by geographic districts, appear in Table I.

The average for the various districts, with departures from the normal, are shown in the following table:

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England.....	4.9	- 0.7	Missouri Valley.....	6.3	+ 0.7
Middle Atlantic.....	5.5	0.0	Northern Slope.....	6.0	+ 0.7
South Atlantic.....	4.8	+ 0.1	Middle Slope.....	6.7	+ 2.3
Florida Peninsula.....	4.7	+ 0.7	Southern Slope.....	5.1	+ 0.7
East Gulf.....	5.1	+ 0.4	Southern Plateau.....	5.1	+ 2.1
West Gulf.....	6.1	+ 0.9	Middle Plateau.....	5.6	+ 0.3
Ohio Valley and Tennessee.....	5.5	- 0.4	Northern Plateau.....	6.0	- 0.3
Lower Lake.....	6.0	- 0.4	North Pacific.....	7.0	+ 0.3
Upper Lake.....	6.3	+ 0.4	Middle Pacific.....	5.5	+ 0.5
North Dakota.....	6.4	+ 0.9	South Pacific.....	5.3	+ 0.8
Upper Mississippi Valley.....	6.4	+ 0.9			

WIND.

The winds during the month were generally light in character, and, except on the immediate Pacific coast and at a few exposed points, did not attain velocities as high as 50 miles per hour.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Carson City, Nev.....	20	56	sw.	North Head, Wash.....	13	58	se.
Chicago, Ill.....	27	52	sw.	Do.....	19	52	s.
Do.....	28	54	s.	Do.....	20	78	se.
Columbus, Ohio.....	26	52	sw.	Do.....	22	60	se.
Do.....	29	52	sw.	Do.....	23	73	se.
Devils Lake, N. Dak.....	28	50	n.	Do.....	24	72	s.
El Paso, Tex.....	27	53	w.	Do.....	27	62	se.
Lexington, Ky.....	29	60	sw.	Do.....	28	54	s.
Modena, Utah.....	26	50	w.	Do.....	31	60	se.
Mount Tamalpais, Cal.....	12	75	se.	Sioux City, Iowa.....	27	52	s.
Do.....	16	54	nw.	Tatoosh Island, Wash.....	1	50	s.
Do.....	17	59	nw.	Do.....	7	50	ne.
Do.....	18	60	nw.	Do.....	8	52	e.
Do.....	19	58	nw.	Do.....	9	50	e.
Do.....	26	62	nw.	Do.....	11	60	e.
Do.....	27	63	nw.	Do.....	12	66	e.
Do.....	28	54	sw.	Do.....	13	64	e.
Do.....	29	50	nw.	Do.....	24	60	sw.
Do.....	30	58	w.	Do.....	25	56	sw.
Mount Weather, Va.....	4	58	nw.				

TABLE I.—Climatological data for Weather Bureau stations, March, 1905.

Stations.	Elevation of instruments.			Pressure, in inches.		Temperature of the air, in degrees Fahrenheit.										Precipitation, in inches.			Wind.					Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.							
	Barometer above sea level, feet.	Thermometers above ground.	A thermometer above ground.	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Mean max. + mean min. + 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Miles per hour.	Direction.	Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.			
New England.																																		
Eastport	76	69	82	29.97	30.06	+.13	33.3	+.0.9	32	29	35	1	21	25	26	73	2.35	1.10	1.10	1.10	10	7,586	sw.	36	sw.	11	12	12	7	4.9	6.2			
Portland, Me.	103	81	117	29.96	30.09	+.13	31.6	+.0.4	32	29	33	6	24	26	28	71	1.97	1.4	1.4	1.4	11	6,105	sw.	31	sw.	4	14	6	11	4.9	12.6			
Concord	288	70	79	29.77	30.10	+.10	31.6	+.0.4	65	30	42	0	21	34	34	74	3.46	0.0	0.0	0.0	13	3,608	sw.	20	sw.	21	14	7	10	4.8	6.4			
Northfield	876	16	60	29.13	30.11	+.11	26.2	+.1.2	63	29	38	9	14	40	23	18	74	2.06	0.8	0.8	10	5,324	sw.	38	sw.	19	12	11	8	4.8	6.4			
Boston	125	115	181	29.96	30.10	+.13	37.2	+.3.0	69	30	45	12	29	30	32	64	2.25	1.8	1.8	1.8	10	7,484	sw.	29	sw.	21	12	8	11	5.2	3.6			
Nantucket	12	14	90	30.08	30.09	+.11	36.0	+.1.1	58	28	41	18	31	18	33	31	3.12	0.4	0.4	0.4	12	11,648	sw.	48	sw.	22	11	10	10	5.3	T.			
Block Island	26	11	46	30.08	30.11	+.13	35.2	+.0.4	58	28	41	15	30	18	32	29	81	2.19	1.8	1.8	9	11,569	sw.	49	sw.	21	16	4	11	4.6	0.1			
Providence	159	57	67	29.94	30.12	+.14	36.6	+.1.1	67	28	45	11	25	33	32	67	1.98	1.98	1.98	1.98	11	5,236	sw.	28	sw.	27	15	5	11	4.8	1.2			
Hartford	159	115	132	29.95	30.13	+.14	36.2	+.1.1	71	29	45	10	25	36	31	26	69	3.35	1.2	1.2	12	4,809	sw.	25	sw.	27	14	10	7	4.6	0.4			
New Haven	106	116	154	30.01	30.13	+.14	36.8	+.1.2	79	31	44	12	29	29	32	27	71	2.96	1.2	1.2	13	6,114	sw.	30	sw.	27	13	11	7	4.5	0.6			
Mid. Atlantic States.																																		
Albany	97	102	115	30.02	30.13	+.12	33.0	+.1.1	79	29	42	4	24	41	29	25	76	3.06	0.2	0.2	11	5,161	sw.	24	sw.	24	8	9	14	6.2	8.2			
Binghamton	875	79	90	29.16	30.12	+.10	33.2	+.2.4	80	29	41	2	22	42	42	77	3.65	0.3	0.3	9	4,158	sw.	26	sw.	27	8	12	11	6.0	5.6				
New York	314	108	350	29.77	30.12	+.12	40.0	+.3.1	74	29	47	14	33	31	36	32	77	3.65	0.3	0.3	13	8,441	sw.	47	sw.	27	15	3	13	5.1	3.0			
Harrisburg	374	94	104	29.72	30.13	+.10	41.0	+.4.8	79	29	49	16	33	36	36	31	70	3.17	0.3	0.3	11	4,637	sw.	30	sw.	27	13	4	14	5.9	1.8			
Philadelphia	117	116	184	30.00	30.14	+.12	42.9	+.3.8	79	29	51	16	35	36	37	31	68	4.18	0.9	0.9	13	7,528	sw.	33	sw.	6	14	4	13	5.3	4.5			
Seranton	805	111	119	29.24	30.12	+.10	37.9	+.2.0	84	29	48	4	28	40	33	29	77	4.13	0.3	0.3	13	5,080	sw.	34	sw.	27	6	12	13	6.5	8.8			
Atlantic City	52	39	48	30.07	30.13	+.11	39.6	+.2.0	69	31	46	15	34	27	36	32	79	4.34	0.4	0.4	13	5,660	sw.	22	sw.	21	12	3	16	5.7	0.2			
Cape May	17	48	52	30.13	30.15	+.14	40.2	+.0.7	66	31	46	16	34	20	37	32	67	2.80	1.6	1.6	12	5,950	sw.	29	sw.	24	12	10	9	5.0	T.			
Baltimore	123	69	117	30.00	30.13	+.10	44.6	+.3.1	80	28	53	20	36	35	38	32	67	3.23	0.9	0.9	12	4,875	sw.	32	sw.	30	7	11	13	6.2	0.2			
Washington	112	59	76	30.00	30.13	+.09	45.0	+.3.7	80	29	55	14	32	35	36	39	68	3.31	0.8	0.8	10	4,576	sw.	33	sw.	4	8	11	12	5.8	4.8			
Lynchburg	681	83	88	29.36	30.12	+.07	48.7	+.3.5	80	28	60	24	37	37	44	39	76	2.21	1.5	1.5	10	2,762	sw.	30	sw.	4	10	11	10	5.7	5.7			
Mount Weather	1,725	10	57	28.26	30.12	+.07	41.4	+.3.2	75	29	49	12	34	29	38	35	82	1.93	1.8	1.8	11	11,225	sw.	58	sw.	4	12	7	12	4.5	T.			
Norfolk	91	102	111	30.04	30.14	+.11	50.1	+.3.2	80	29	59	28	34	41	35	43	39	74	2.80	1.8	1.8	10	7,133	sw.	33	sw.	4	14	7	10	4.9	T.		
Richmond	144	82	90	29.99	30.15	+.11	49.8	+.4.5	79	29	60	25	34	40	33	43	39	74	2.18	1.8	1.8	10	4,314	sw.	30	sw.	4	15	9	7	3.9	T.		
Wytheville	2,293	40	47	27.69	30.10	+.05	47.8	+.4.5	75	28	59	27	37	40	42	38	77	1.58	2.2	2.2	9	3,710	sw.	28	sw.	4	9	14	8	4.9	4.9			
Atlantic States.																																		
Asheville	2,255	53	75	27.73	30.10	+.04	51.2	+.4.2	73	28	62	31	40	38	45	41	75	2.91	1.5	1.5	12	5,966	sw.	30	sw.	29	10	8	13	5.8	4.8			
Charlotte	773	68	76	29.27	30.12	+.07	53.8	+.5.9	76	28	65	34	46	33	48	42	68	0.95	3.8	3.8	8	5,560	sw.	30	sw.	21	12	6	13	5.4	5.4			
Hatteras	11	12	47	30.12	30.13	+.09	53.8	+.3.7	73	30	60	32	3	48	24	49	47	83	2.29	3.8	3.8	11	12,132	sw.	46	sw.	12	18	10	3	3.6	3.6		
Raleigh	376	71	79	29.72	30.12	+.07	53.8	+.5.6	78	29	64	28	3	43	37	46	40	66	3.39	0.7	0.7	10	5,201	sw.	25	sw.	26	14	9	8	4.3	4.3		
Wilmington	78	82	90	30.02	30.10	+.05	56.6	+.2.7	78	4	66	34	3	47	34	50	47	78	3.19	0.8	0.8	9	7,029	sw.	30	sw.	9	13	13	5	4.1	4.1		
Charleston	48	14	92	30.06	30.11	+.05	59.6	+.2.9	78	30	66	44	3	53	27	54	51	83	2.50	1.4	1.4	7	8,747	sw.	36	sw.	5	14	9	8	4.5	4.5		
Columbia, S. C.	351	41	57	29.72	30.11	+.05	59.0	+.4.8	81	19	69	37	3	49	32	51	45	69	2.26	2.3	2.3	6	5,937	sw.	30	sw.	9	8	16	7	5.5	5.5		
Augusta	180	89	97	29.91	30.10	+.04	59.3	+.3.8	81	28	70	35	3	49	34	52	48	74	1.87	3.3	3.3	8	5,121	sw.	26	sw.	9	14	9	8	4.4	4.4		
Savannah	65	81	89	30.04	30.11	+.05	61.3	+.2.8	82	19	69	41	3	53	28	54	51	79	4.07	0.3	0.3	9	6,343	sw.	26	sw.	9	11	8	12	5.6	5.6		
Jacksonville	43	101	129	30.02	30.07	+.01	63.4	+.1.4	81	19	71	44	3	56	27	57	55	84	6.47	3.0	3.0	9	7,315	sw.	40	sw.	24	11	10	10	5.1	4.7		
Florida Peninsula.																																		
Jupiter	28	10	48	30.02	30.05	+.00	71.9	+.4.1	83	10	78	52	1	65	24	65	63	80	5.39	2.4	2.4	10	8,191	sw.	32	sw.	9	9	18	4	4.4	4.4		
Key West	22	10	33	30.01	30.03	+.02	73.4	+.0.7	83	22	78	63	1	69	15	67	65	79	6.13	4.9	4.9	5	7,653	sw.	30	sw.	12	11	14	6	4.7	4.7		
Tampa	34	79	96	30.02	30.06	+.01	69.0	+.3.5	84	30	78	46	3	60	28	62	59	80	2.00	0.8	0.8	7	5,679	sw.	30	sw.	20	11	11	9	5.1	5.1		
East Gulf States.																																		
Atlanta	1,174	190	216	28.85	30.10	+.04	57.6	+.6.1	78	28	66	41	14	49	26	51	46	72	0.88	4.9	4.9	8	9,265	sw.	42	sw.	24	9	13	9	5.6	5.6		
Macon	370	93	99	29.69	30.09	+.03	60.2	+.8.1	81	28	70	40	1	50	37	48	43	63	2.70	0.7	0.7	7	5,247	sw.	23	sw.	11	12	7	12	5.2	5.2		
Pensacola	56	79	96	30.02	30.08	+.02	63.2	+.3.7	76																									

TABLE I.—Climatological data for Weather Bureau stations, March, 1905—Continued.

Stations.	Elevation of instruments.		Pressure, in inches.		Temperature of the air, in degrees Fahrenheit.										Precipitation, in inches.		Wind.				Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.			
	Barometer above sea level, feet.	Thermometers above ground.	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Mean max. + mean min. + 2.	Departure from normal.	Maximum.	Date.	Mean minimum.	Date.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Total.	Departure from normal.	Days with .01 or more.	Total movement, miles.	Prevailing direction.	Miles per hour.	Direction.	Date.					
North Dakota.																												
Moorhead	935	8	28.98	30.03	-.03	33.7	+11.6	66	26	42	1	12	39	28	74	0.61	-.03	7	7,019	se.	38	nw.	10	3	10	18	6.4	
Bismarck	1,674	16	28.18	30.01	-.05	34.4	+11.8	60	4	45	1	10	24	46	82	1.16	+0.1	4	8,951	nw.	46	nw.	28	13	4	14	5.8	
Devils Lake	1,482	11	28.89	30.01	-.04	29.0	.....	62	25	40	-11	12	13	43	24	0.18	.....	3	10,448	se.	50	n.	28	7	7	17	6.6
Williston	1,875	14	27.95	29.98	-.06	34.4	+10.9	58	2	47	-3	12	22	40	30	0.18	-.03	3	8,397	se.	48	sw.	22	10	5	16	6.1	
Upper Miss. Valley.																												
Minneapolis	102	208	.....	.....	.....	33.1	+7.5	67	26	43	3	11	27	34	.....	0.73	-.08	8	9,140	se.	38	nw.	10	3	10	18	.....
St. Paul	837	171	29.08	30.01	-.04	36.2	+7.7	66	3	44	4	12	29	36	32	1.02	-.04	6	7,887	se.	36	nw.	10	7	8	16	6.4	
La Crosse	714	71	29.25	30.04	-.00	36.8	+6.0	71	28	44	6	11	30	30	.....	1.20	+0.4	10	5,491	s.	30	se.	27	9	8	14	6.4
Madison	974	70	28.97	30.06	+.02	34.4	.....	73	28	42	5	11	27	25	31	1.74	-.04	8	8,412	se.	42	ne.	4	8	8	15	6.3
Charles City	1,015	8	28.92	30.03	-.02	36.2	.....	70	31	44	4	11	28	32	33	1.86	-.01	14	6,216	se.	35	se.	27	3	9	19	7.8
Davenport	606	71	29.37	30.04	+.01	42.0	+7.1	73	31	50	14	11	34	37	33	2.21	+0.0	10	5,721	e.	25	e.	19	6	9	16	6.9	
Des Moines	861	84	29.10	30.03	-.01	43.5	+8.8	77	27	57	14	11	34	44	38	2.16	+0.7	10	6,999	s.	47	s.	27	4	12	15	6.9	
Dubuque	698	100	29.28	30.06	+.02	39.0	+6.1	73	28	46	8	11	32	29	35	2.27	+0.0	11	5,486	s.	42	sw.	27	7	6	18	7.0	
Keokuk	614	63	29.35	30.04	+.01	46.8	+9.2	78	27	57	14	11	37	33	40	1.78	-.04	10	6,211	n.	36	sw.	25	10	11	11	5.5	
Cairo	356	87	29.68	30.07	+.03	53.3	+6.5	79	28	62	32	11	44	33	47	2.84	-.09	9	7,785	n.	46	nw.	23	12	5	14	5.9	
La Salle	536	56	29.48	30.07	+.04	41.4	.....	74	31	50	16	11	33	35	.....	1.83	.....	12	6,361	ne.	34	s.	25	6	12	13	6.4
Peoria	609	11	29.39	30.07	+.04	43.9	.....	74	28	53	15	11	35	32	.....	2.00	.....	9	7,280	s.	32	s.	24	7	13	11	6.5
Springfield, Ill.	644	82	29.35	30.05	+.02	46.6	+7.4	75	31	56	18	11	37	42	40	1.48	-.12	8	7,443	s.	32	s.	25	8	9	14	6.2	
Hannibal	534	75	29.45	30.03	+.01	47.8	+8.3	80	27	58	18	11	37	45	.....	1.52	-.12	8	6,965	ne.	41	sw.	25	8	9	14	6.2
St. Louis	567	208	29.43	30.04	+.01	49.9	+6.8	78	27	60	24	11	40	34	43	2.35	-.11	9	8,336	s.	46	sw.	17	13	7	11	5.5	
Missouri Valley.																												
Columbia, Mo.	784	11	29.17	30.02	-.01	49.6	+8.2	82	27	61	19	11	38	42	.....	0.92	-.21	9	6,995	s.	39	sw.	25	9	10	12	5.6
Kansas City	963	78	28.98	30.03	+.01	50.8	+10.3	79	27	60	24	11	41	33	44	3.68	+1.5	9	6,167	se.	37	s.	27	9	12	10	5.6	
Springfield, Mo.	1,324	98	28.61	30.02	-.00	52.1	+8.6	78	31	61	30	11	43	29	45	40	5.56	+1.8	13	8,413	se.	42	w.	25	13	6	12	5.1
Topeka	85	89	.....	.....	.....	51.0	+10.0	79	27	61	26	11	41	37	.....	4.75	+2.6	10	7,613	s.	41	s.	27	8	14	9	5.7
Lincoln	1,189	75	28.69	29.98	-.04	46.0	+9.9	84	27	56	20	11	36	36	39	34	6.09	-.08	7	8,210	sw.	42	n.	18	5	7	19	7.4
Omaha	1,105	115	28.80	29.99	-.05	45.7	+10.2	82	27	55	17	11	36	36	39	34	7.01	-.08	11	6,893	s.	38	nw.	25	4	6	21	7.6
Valentine	2,598	47	28.73	29.98	-.05	39.8	+8.6	75	26	52	12	13	27	43	34	28	7.01	-.08	11	8,460	nw.	40	nw.	23	6	16	9	5.7
Sioux City	1,135	96	28.74	29.98	-.07	41.8	+10.2	82	27	51	13	11	33	34	.....	1.41	+0.2	8	9,972	se.	52	s.	27	4	8	19	7.2
Pierre	1,572	43	28.29	29.99	-.06	41.0	+11.6	75	26	52	15	13	30	44	35	2.87	+0.5	4	6,753	nw.	36	nw.	23	6	13	12	6.0	
Huron	1,306	56	28.57	30.00	-.06	38.0	+10.4	75	27	50	7	12	27	44	33	2.87	-.04	11	8,833	se.	36	e.	30	6	9	16	7.0	
Yankton	1,233	55	28.64	29.98	-.07	40.9	+10.9	81	27	51	15	11	31	41	.....	2.75	+1.6	12	7,338	w.	42	n.	18	3	5	23	8.0
Northern Slope.																												
Havre	2,505	11	27.28	29.95	-.05	40.0	+11.0	71	2	52	10	11	28	44	34	27	6.05	-.04	2	8,430	e.	42	w.	25	9	17	5	5.0
Miles City	2,371	42	27.39	29.96	-.06	42.8	+11.4	74	2	55	18	12	31	40	36	33	7.81	-.05	2	.....	.....	.....	.....	.....	.....	.....	.....
Helena	4,110	8	25.74	29.99	-.02	38.2	+5.6	66	3	48	6	13	29	31	32	24	6.01	+0.4	10	5,324	w.	35	w.	22	8	12	11	5.9
Kalispell	2,962	11	26.85	29.94	-.05	39.4	67	2	50	16	11	29	34	33	27	6.76	7	3,859	w.	26	sw.	21	10	13	8	5.4
Rapid City	3,234	46	26.54	30.01	-.00	39.2	+8.0	75	4	50	13	10	28	41	34	29	7.33	-.01	6	5,918	nw.	26	n.	6	10	5	16	6.0
Cheyenne	6,088	56	23.92	29.96	-.00	37.6	+4.8	63	26	48	15	8	27	36	32	25	6.34	+0.6	13	7,756	nw.	42	nw.	25	3	12	16	7.1
Lander	5,372	26	24.56	29.97	-.02	37.1	+6.6	62	4	50	14	28	24	43	31	25	6.41	-.05	6	3,224	nw.	44	sw.	26	4	19	8	5.6
Yellowstone Park	6,200	11	23.78	29.99	-.03	32.3	60	2	43	5	11	21	38	27	21	6.61	14	5,623	s.	32	nw.	26	6	12	13	6.4
North Platte	2,821	48	27.03	29.99	-.01	43.0	+7.9	76	30	55	22	12	31	47	37	32	7.25	+1.4	14	6,925	nw.	38	nw.	25	6	14	11	6.4
Middle Slope.																												
Denver	5,291	129	24.64	29.94	-.01	43.4	+7.4	70	26	54	23	8	32	36	35	27	6.3	+1.4	11	5,310	n.	49	n.	22	3	15	13	6.8
Pueblo	4,685	80	23.20	29.90	-.02	45.5	+5.1	74	26	56	24	9	34	39	38	29	6.06	+2.5	10	5,615	se.	40	w.	27	3	20	8	6.2
Concordia	1,398	42	28.50	29.99	-.02	49.6	+10.6	86	27	60	28	11	39	45	42	35	6.67	-.08	7	6,282	s.	35	s.	30	2	14	15	7.3
Dodge	2,509	44	27.35	29.97	-.00	49.0	+7.4	80	27	60	26	8	38	41	42	37	7.21	+0.2	10	9,287	se.	40	se.	30	4	4	23	8.2
Wichita	1,358	78	28.56	30.00	+.01	52.6	+9.1	81	27	63	30	11	42	37	46	40	7.58	+1.8	10	7,558	s.	39	s.	27	8	16	7	5.4
Oklahoma	1,214	79	28.68	29.97	-.01	56.7	+7.6	82	27	66	38	8	47	30	50	46	7.6	+2.3	9	8,782	se.	42	s.	27	4	14	13	6.3
Southern Slope.																												
Abilene	1,738	45	28.14	29.93	-.03	59.3	+5.2	85	27	69	36	8	50	32	51	46	7.71	+1.5	10	7,656	se.	37	se.	31	8	11	12	5.6
Amarillo	3,676	10	26.19	29.92	-.03	50.4	+5.5	78	27	61	8	40	41															

TABLE II.—Climatological record of cooperative observers, March, 1905.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Alabama.	°	°	°	Ins.	Ins.
Alaga	81	26	53.1	3.06	
Anniston	81	31	56.4	2.59	
Ashville	81	31	56.4	2.59	
Benton	85	33	61.3	5.49	
Bermuda	83	34	61.1	2.93	
Boligee	83	34	61.1	2.93	
Bridgeport				4.60	
Burkeville				3.40	
Calera				4.15	
Camp Hill	83	39	61.8	1.75	
Cedar Bluff				2.65	
Citronelle	81	43	63.2	7.05	
Cordova	85	29	58.6	3.24	
Dadeville				1.28	
Daphne	81	43	63.5	7.97	
Decatur	82	38	58.4	4.52	
Delmar	82	35	59.2	3.30	
Demopolis				3.32	
Eufaula	81	34	58.9	4.34	
Evergreen	81	37	60.8	2.92	
Flomaton	86	33	61.6	3.45	
Florence	83	34	58.4	3.41	
Fort Deposit				3.25	
Gadsden	83	33	58.6	2.66	
Goodwater	82	36	60.5	4.02	
Greensboro	82	41	61.8	3.43	
Greenville				3.17	
Guntersville				1.87	
Hamilton	84	29	59.0	4.02	
Highland Home	85	42	62.7	3.50	
Letchatchie				3.25	
Livingston	82	35	57.8	3.02	
Lock No. 4	83	31	58.5	3.23	
Lucy	90	37	63.4	4.05	
Madison Station	84	36	59.2	4.57	
Maple Grove	83	30	56.4	2.75	
Marion	83	39	61.6	5.05	
Milledale				1.94	
Newbern	83	33	61.0	3.31	
Notasulga				4.90	
Oneonta	82	31	57.5	2.60	
Opelika	79	45	61.1	2.11	
Ozark	83	35	60.8	1.92	
Prattville	84	32	60.3	3.50	
Pushmataha	87	37	62.8		
Riverton	86	31	58.5	4.46	
Scottsboro	83	30	56.4	4.56	
Selma	82	37	61.2	5.83	
Spring Hill	75	47	63.9	11.05	
Talladega	81	32	59.8	4.21	
Tallassee				2.15	
Thomasville	82	38	60.4	6.70	
Tuscaloosa	84	33	59.5	2.54	
Tuscumbia	82	36	57.8	3.63	
Tuskegee	87	39	60.3	1.95	
Union Springs	83	41	61.2	2.60	
Uniontown	83	34	59.4	4.34	
Valleyhead	82	28	56.2	2.87	
Verbena				1.29	
Wetumpka	84	32	61.6	3.14	
Alaska.					
Chestecheena	50	-8	22.6	0.08	0.8
Fort Liscum	54	16	32.8	7.17	68.7
Junea	56	30	42.6	5.90	0.2
Ketchikan	40	-27	5.2	0.05	0.5
Killsnoo	53	26	39.5	2.60	1.0
Loring	63	26	40.2	16.53	T.
Ora	61	22	38.8	12.51	13.0
Sitka	65	31	44.0	4.21	
Skagway	54	26	37.9	1.14	
Sunrise	58	11	32.7	1.64	13.1
Tanana				0.18	1.0
Wood Island	65	22	40.2	2.60	3.0
Arizona.					
Allaire Ranch				4.11	0.5
Alpine				4.91	28.9
Arizona Canal Co. Dam	83	38	61.1	3.27	
Artes	91	37	63.8	2.27	
Benson	81	32	54.6	4.20	
Bisbee	73	28	49.4	5.26	4.0
Blue	71	24	44.2	4.68	17.0
Bowie	81	32	55.5	2.65	
Buckeye	92	33	61.0	3.61	
Casagrande	86	40	61.5	1.98	
Champer Camp	80	26	52.0	6.85	
Cochise	68	35	48.3	4.70	T.
Congress	74	35	54.2	5.30	
Douglas	83	32	55.1	2.75	T.
Dragon	75	33	51.8	4.00	
Dudleyville	84	32	57.6	3.75	T.
Duncan	78	23	50.7	3.36	
Fort Apache	73	27	45.6	6.79	10.0
Fort Defiance	63	15	36.2	1.76	5.0
Fort Grant	78	28	51.6	0.99	2.0
Fort Huachuca	71	30	50.4	6.77	1.0
Fort Mohave	85	41	63.6	0.98	
Gilaband	86	42	66.0	2.74	
Greaterville	70	29	48.8	4.06	T.
Arizona—Cont'd.					
Greer				4.50	37.0
Huachuca Reservoir				6.61	12.0
Holbrook	73	26	47.7	2.93	
Jerome	72	32	50.0	7.30	
Kingman	75	28	52.2	3.05	T.
Maricopa	83	40	60.4	1.72	
Mesa	83	39	59.7	3.42	
Mohawk Summit	81	50	64.2	1.05	
Natural Bridge				7.59	T.
Nutriso				6.77	23.5
Oracle	71	30	51.2	5.77	2.0
Oro				6.07	
Parker	92	39	64.6	1.25	
Phoenix	83	37	59.8	3.75	
Picacho	84	48	64.7	1.85	
Pinal Ranch				10.03	5.5
Pinto				1.95	T.
Prescott	70	21	45.4	6.17	14.0
San Carlos	81	37	57.1	3.30	T.
San Simon	90	33	62.0	6.63	
Seligman	70	24	44.8	2.16	2.0
Sentinel	90	55	66.0		
Showlow				6.64	35.5
Superstition				5.98	
Taylor	70	24	45.4	2.48	2.0
Tempe	85	34	59.6	4.32	
Thatcher	80	33	54.4	3.21	
Tombstone	76	31	51.2	4.78	4.0
Tuba	72	12	42.3	0.96	
Tucson	74	36	54.0	3.88	
Vail	78	47	61.0	2.05	
Walnut Grove				4.32	T.
Wilcox	79	31	51.2	5.00	1.0
Williams	63	18	40.2	3.96	13.0
Yarnell				8.94	1.0
Young	82	28	52.8	7.50	
Arkansas.					
Amity	86	34	59.4	7.02	
Arkadelphia	82	36	59.0	5.63	
Arkansas City				5.56	
Batesville	78	34	56.0	3.65	
Beebranch	78	29	53.2	3.15	
Black Rock				3.95	
Blanchard Springs	82	33	58.5	7.58	
Brinkley	92	32	59.6	5.82	
Calico Rock				4.80	
Camden	81	37	63.1	8.10	
Clarendon				5.74	
Conaway	79	33	58.8	4.14	
Dallas	81	33	58.8	6.63	
Dardanelle				3.66	
Des Arc	79	34	60.4	5.49	
Dodd City	79	28	53.2	3.50	
Dutton	75	27	53.0	4.96	
Eldorado	82	36	59.4	7.32	
Elon	83	31	60.4	5.95	
Eureka Springs	79	31	55.4	6.98	
Fayetteville	76	28	53.0	6.27	
Forrest City	82	33	58.0	2.06	
Fulton				6.00	
Hardy	78	30	55.0	4.58	
Heber	81	31	57.8	3.92	
Helena	82	34	57.6	8.02	
Hope	86	38	61.4	6.17	
Howe	86	35	61.6	7.07	
Jonesboro	85	32	56.2	5.85	
Lacroce	77	28	53.2	3.71	
Lake Village	83	33	58.8	7.50	
Lonoke	85	34	58.8	4.36	
Lutherville	89	26	56.0	3.74	
Luxora				2.67	
Malvern	80	30	56.7	6.30	
Mammoth Springs				3.48	
Marked Tree				6.85	
Marvell	82	35	59.4	6.34	
Mossville	71	30	52.6	6.41	
Mount Nebo	75	34	56.1	3.58	
New Lewisville				6.00	
Newport	82	32	56.9	5.14	
Oregon	76	28	52.9	3.64	T.
Ozark	81	31	56.6	3.72	
Ozola	82	34	58.6	4.45	
Perry	79	34	54.8	4.14	T.
Pinebluff	88	31	58.1	6.22	
Pinebluff	80	30	54.4	4.14	
Ponchartrons	78	27	54.4	7.38	
Pond	81	37	60.0	6.78	
Prescott	81	33	58.1	6.94	
Princeton	79	29	53.4	1.94	
Russellville	78	30	54.8	5.83	
Silversprings	81	33	58.4	3.67	
Sprieville				5.65	
Springbank	81	33	58.6	6.87	
Stuttgart	81	30	59.0		
Tate	80	35	59.7	5.95	
Texarkana	84	31	58.0	10.80	
Warren				6.46	
White Cliffs	79	30	56.8	5.79	
Arkansas—Cont'd.					
Winchester	82	34	58.6	4.70	
Witts Springs	69	32	51.2	3.70	
California.					
Alturas				2.96	
Angiola	88	26	56.8	2.40	
Azusa	83	36	57.8	6.43	T.
Bagdad				2.36	
Bakersfield	86	25	59.2	2.12	
Barber				3.74	
Barstow	80	45	62.7	3.50	T.
Bear Valley				14.06	30.0
Berkeley	75	34	54.3	4.25	
Bishop	77	21	48.2	4.25	T.
Blue Canyon	69	22	42.3	12.45	24.0
Bodie	56	-14	30.6	3.09	23.5
Bowman				20.42	59.0
Branscomb	82	28	48.8	14.73	1.0
Brush Creek	78	26	49.8	13.20	5.0
Butte Valley				13.06	22.0
Calexico	90	46	64.8	0.91	
Cambria				4.92	
Campbell	78	34	55.2	3.39	
Campo				6.87	18.0
Cedarville	69	10	41.9	3.37	12.5
Chico	81	33	55.5	4.63	
Claremont	84	36	57.6	6.26	0.2
Cloverdale	87	33	56.2	8.71	
Colusa	80	35	56.8	2.44	
Crescent City	78	33	51.8	11.41	
Crocker				11.32	6.0
Cuyamaca	62	20	41.0	15.63	5.8
Delta	84	32	53.4	14.68	4.0
Dobbins	91	38	57.6	8.29	1.0
Drytown	76	32	54.5	7.60	
Durham	82	31	55.9	3.86	
El Cajon	83	33	58.8	4.23	
Electra	78	36	57.8	6.93	
Elmdale				0.88	
Elsinore	80	32	58.1	4.36	
Emigrant Gap	65	20	41.5	11.25	47.0
Escondido	84	26	58.4	5.75	
Folsom	82	35	57.3	4.83	
Fordey Dam				10.83	83.0
Fort Bragg				7.97	
Fort Ross	67	36	53.4	12.45	
Foster				5.76	
Georgetown	77	29	50.4	10.69	5.0
Gilroy (near)	84	34	56.8	3.67	
Glens Ranch				11.84	
Greenville	76	16	44.5	7.74	7.0
Hanford	84	31	58.4	2.10	
Healdsburg	91	33	56.8	8.41	
Hollister	80	34	56.1	3.41	
Indio	88	43	64.1	1.30	
Idyllwild	68	13	44.0	10.07	3.0
Imperial	94	43	64.6	1.05	
Iowa Hill	79	28	50.6	10.21	7.2
Irvine				6.68	
Isabella	78	31	54.5	5.03	
Jolon				6.29	
Kennedy Gold					

TABLE II.—Climatological record of cooperative observers—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
California—Cont'd.					
Orleans	90	34	57.4	Ins.	Ins.
Oroville (near)	82	33	56.6	5.06	1.0
Palermo	81	33	55.7	4.46	
Peachland	86	33	55.2	6.60	
Pilot Creek	80	36	57.4	9.35	11.0
Pine Crest	74	28	50.0	7.67	
Placerville	70	44	60.2	2.81	
Point Lobos	74	37	54.2	3.62	
Point Reyes Light	79	32	59.2	3.24	
Poway	67	22	45.0	8.87	6.0
Quincy	81	32	55.2	7.95	
Redding	85	32	59.6	3.48	
Reedley	79	33	56.3	3.34	
Reprea	87	35	57.8	4.87	
Rivista	82	34	56.6	4.76	
Riverside	78	36	56.9	4.21	
Rocklin	81	34	57.2	3.74	
Sacramento	90	45	65.8	2.26	
Salinas	83	35	58.0	6.00	T.
Salton	89	28	50.3	4.89	
San Bernardino	81	36	57.9	2.73	
San Jacinto	78	32	55.4	4.16	
San Jose	81	40	57.5	6.32	
San Leandro	80	43	59.1	6.40	
San Miguel Island	82	33	56.6	3.06	
San Rafael	79	30	55.8	5.15	
Santa Barbara	81	37	58.6	4.46	
Santa Clara College	85	31	54.4	5.59	
Santa Cruz	83	32	55.0	7.12	
Santa Maria	82	42	57.2	9.28	1.0
Santa Rosa	82	42	57.2	9.28	T.
Sausalito	71	16	43.0	8.04	11.0
Shasta	83	32	55.0	11.12	
Sierra Madre	82	42	57.2	9.28	T.
Sisquoc Ranch	71	16	43.0	8.04	11.0
Sisson	83	32	55.0	11.12	
Snedden	82	42	57.2	9.28	T.
Sonoma	70	37	53.8	7.82	2.0
Sonora	62	45	54.6	3.25	12.0
Southeast Farallon	76	36	54.7	3.13	
Sterling	79	30	55.0	2.29	
Stockton	67	16	42.4	10.53	18.0
Storey	52	15	37.0	10.70	107.0
Sumnerdale	65	13	42.2	3.31	6.0
Summit	80	36	57.4	3.52	
Susanville	68	6	41.6	3.36	16.0
Telam	86	32	58.2	4.38	
Truckee	85	31	54.0	6.80	
Tulare	78	36	55.0	6.87	
Tustin	84	34	56.2	3.88	0.5
Ukiah	83	30	56.8	4.19	
Upland	90	42	65.2	1.15	
Upperlake	85	32	57.8	2.03	
Upper Mattole	85	30	57.0	3.00	
Yacerville	84	34	56.2	3.88	
Yaleville	83	30	56.8	4.19	
Yreka	90	42	65.2	1.15	
Yosemite	85	32	57.8	2.03	
Zenith	85	30	57.0	3.00	
Colorado—Cont'd.					
Akron	64	9	38.0	1.22	5.0
Alford	51	—	27.2	3.64	43.3
Antelope Springs	50	4	27.7	1.99	30.0
Ashcroft	78	23	47.4	1.57	0.2
Blaine	71	23	44.5	1.85	7.5
Boulder	49	—	27.9	1.63	21.5
Breckenridge	74	18	43.8	1.74	
Burlington	73	21	46.0	1.21	T.
Canyon	67	20	41.6	1.54	5.0
Cedaredge	63	14	39.4	1.89	4.0
Cheesman	72	18	45.1	2.60	T.
Cheyenne Wells	52	5	30.4	3.10	38.0
Clearview	62	9	40.8	3.18	12.5
Collbran	67	19	41.0	2.41	1.8
Colorado Springs	58	10	36.3	0.23	T.
Conejos	61	1	38.2	1.75	16.2
Cripple Creek	70	12	42.2	1.75	2.5
Eagle	73	16	45.0	2.65	T.
Fort Collins	72	17	42.8	3.55	2.0
Fort Morgan	60	10	34.3	2.49	30.2
Fowler	69	24	45.6	1.60	
Fox	60	14	35.6	0.90	9.0
Frances	70	13	40.8	1.42	2.0
Fruita	65	20	41.2	1.24	
Garnett	67	24	44.1	1.78	1.5
Gleneyre	73	19	43.6	1.62	2.0
Glenwood Springs					
Grand Valley					
Greeley					
Colorado—Cont'd.					
Gunnison	61	12	33.6	0.29	1.5
Halls Gulch	56	5	26.2	3.47	46.5
Hamp	69	11	40.4	3.48	2.5
Hoehe	75	13	42.0	2.21	1.0
Holly	78	21	48.0	0.94	T.
Husted	69	15	38.5	1.5	
Idaho Springs	65	12	37.6	1.26	10.5
Lake Moraine	46	—	26.4	3.95	50.0
Lamar	80	20	49.4	1.00	
Laporte	77	20	47.2	1.63	T.
Las Animas	61	11	35.4	1.92	15.5
Lay	70	17	41.6	3.28	9.0
Leroy	54	—	29.5	2.42	37.0
Longs Peak	65	16	39.4	5.02	30.5
Mancos	63	4	39.6	2.38	14.2
Marshall Pass	61	22	42.4	1.97	23.0
Meeker	57	3	33.6	1.97	
Montrose	59	12	34.4	2.81	8.0
Moraine	65	22	41.3	1.75	T.
Pagoda	77	18	45.2	2.11	3.5
Panola	63	9	37.2	0.30	3.0
Platte Canyon	64	6	39.6	1.82	6.0
Rockyford	65	8	40.4	1.10	11.0
Saguache	63	13	37.0	5.82	54.0
Salida	75	17	45.9	0.78	0.2
San Luis	63	18	41.4	1.40	3.0
Santa Clara	50	—	29.6	5.58	46.6
Sheridan Lake	60	8	35.3	2.31	19.0
Silt	77	21	47.8	2.23	
Silverton	51	8	31.0	2.92	31.7
Sugar Loaf	54	—	33.2	3.90	37.0
Trinidad	49	—	29.2	0.60	8.8
Victor	67	17	41.0	2.00	4.0
Vilas	62	5	35.6	2.31	4.0
Wagon Wheel	47	—	27.6	2.10	24.0
Walden	75	20	43.8	3.10	4.0
Waterdale				4.47	5.5
Westcliffe					
Whiteline					
Wray					
Connecticut					
Bridgeport	72	11	36.8	3.29	0.2
Canton	76	—	32.2	3.21	2.0
Colchester	76	8	35.8	3.31	T.
Falls Village	82	5	35.0	3.72	4.0
Hawleyville	70	13	37.7	2.54	
Lake Konomoc	76	2	34.3	3.31	
New London	72	6	35.2	3.45	T.
North Grosvenor Dale	76	6	34.9	2.90	0.5
Norwalk	73	7	36.0	2.81	1.0
Southington	82	7	35.8	3.59	T.
South Manchester	82	3	32.5	3.12	3.8
Voluntown				2.74	3.0
Waterbury					
West Cornwall					
West Simsbury					
Delaware					
Delaware City	83	17	45.6	2.57	T.
Millford	81	18	45.7	3.14	1.0
Millsboro	78	11	41.7	3.88	0.5
Newark	77	19	44.8	2.20	1.0
Seaford					
District of Columbia					
Distributing Reservoir	82	15	46.6	3.09	
Receiving Reservoir	78	11	45.4	2.66	
West Washington	84	10	44.2	3.77	3.4
Florida					
Apalachicola	81	47	63.9	4.28	
Archer	85	41	66.5	2.20	
Avon Park	89	41	70.2	3.51	
Bartow	89	39	69.2	4.98	
Bonifay	83	35	63.3	3.98	
Brooksville	90	42	68.4	3.73	
Carrabelle	83	44	64.4	5.04	
Clermont	90	47	70.2	2.84	
De Funiak Springs	85	35	63.0	2.90	
Deland	86	37	66.2	4.37	
Eustis	88	40	67.7	4.35	
Federal Point	81	41	62.0	6.54	
Fernandina	85	50	73.2	1.12	
Flamingo	88	37	68.8	6.03	
Fort Meade	90	56	71.4	2.43	
Fort Pierce	85	41	66.4	2.64	
Gainesville	85	44	68.1	4.28	
Grasmere	86	40	65.5	3.97	
Huntington	87	39	66.8	3.08	
Inverness	84	33	62.8	5.28	
Jasper	83	37	63.7	3.04	
Johnstown	85	41	67.8	3.88	
Kissimmee	83	40	66.0	4.46	
Lake City	87	45	64.3	2.99	
Macclenny	87	44	65.0	2.99	
Madison	89	42	69.8	4.33	
Malabar	87	40	68.7	2.26	
Manatee	89	54	72.6	0.30	
Marco	86	34	63.3	5.62	
Marianna					
Florida—Cont'd.					
Merritt Island	85	51	70.0	2.99	
Miami	88	52	73.4	1.69	
Middleburg	86	34	63.5	5.61	
Milton	81	34	60.8	2.83	
Molino	83	31	62.4	4.69	
Monticello	84	40	64.6	5.12	
Myers	86	49	70.4	0.18	
New Smyrna	90	38	66.6	6.42	
Nocatee	87	41	70.7	5.47	
Ocala	88	43	67.4	5.81	
Orange City	92	36	68.1	3.56	
Orange Home	88	39	67.6	3.31	
Orlando	89	38	68.2	5.13	
Pinemount	87	35	63.4	2.93	
Plant City	90	38	68.6	2.83	
Rockwell	86	37	67.2	2.25	
St. Andrews	84	33	62.6	3.62	
St. Augustine	82	41	63.4	6.04	
St. Leo	85	42	67.8	2.68	
Sand Key	84	63	72.5	3.60	
Stephensville	87	35	64.0	2.21	
Sumner	85	33	64.5	3.72	
Switzerland	84	40	63.9	5.90	
Tallahassee	82	42	64.7	4.45	
Tarpon Springs	87	40	66.8	2.12	
Titusville	89	41	68.1	3.15	
Wausau	86	36	60.8	7.99	
Wewahatchka	84	44	64.7	5.83	
Georgia					
Abbeville	79	35	57.3	3.26	
Adairsville	86	37	62.8	5.25	
Albany	86	39	62.0	4.13	
Allapaha	80	39	60.6	4.03	
Americus	77	38	56.5	0.99	
Athens	88	35	63.2	4.14	
Bainbridge	85	36	63.0	3.60	
Blakely	85	37	55.6	1.18	
Bowerville				3.69	
Butler	81	40	59.5	1.96	
Camak	81	33	56.4	1.29	
Carrollton				2.34	
Canton	77	30	53.0	2.92	
Carlton	83	36	61.2	2.18	
Clayton	86	36	59.4	5.61	
Columbus	82	37	60.0	1.94	
Cordele	78	40	59.9	2.46	
Covington	76	31	54.4	2.69	
Cuthbert				3.49	
Dahlonega	77	29	54.6	2.30	
Dawson				3.71	
Diamond	84	40	60.8	2.84	

TABLE II.—Climatological record of cooperative observers—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
<i>Georgia—Cont'd.</i>					
Waycross	84	35	62.7	Ins.	Ins.
Waynesboro	84	40	63.2	4.26	
Westpoint	82	38	60.4	0.65	
Woodbury	81	32	57.4	1.97	
<i>Idaho.</i>					
Albion	61	20	40.8	2.92	6.0
American Falls	66	15	41.6	2.41	
Blackfoot	63	29	41.4	0.80	2.0
Blue Lakes	76	25	48.6	2.09	1.5
Burnside	32	15	40.0	1.81	18.0
Caldwell	72	23	46.6	1.56	1.0
Cambridge	71	18	43.0	2.84	10.6
Chesterfield	55	1	34.1	1.82	7.0
Dewey	68	3	35.6	2.43	23.3
Ellerslie	68	23	45.5	1.43	2.0
Fernwood	61	19	42.3	3.49	3.0
Forney	64	3	37.6	1.69	16.2
Garnet	75	29	50.1	0.77	
Grangeville	68	22	42.4	3.39	9.3
Hope				2.51	
Idaho City	61	15	39.1	2.68	
Idaho Falls	64	20	40.8	1.37	2.0
Kellogg	71	24	41.8	2.58	2.2
Ketchum				2.07	
Lakeview	64	22	41.3	2.77	2.0
Landore	63	8	36.0	5.11	29.6
Lemhi Agency	60	15	37.6		5.0
Lost River	61	9	38.2	1.75	12.0
Lovell	71	24	43.6	2.85	
Malad	65	15	40.2	1.32	
Meadows	62	11	38.8	3.70	
Milner	69	19	43.8	0.83	2.0
Mink Creek				2.70	4.0
Moscow	65	27	43.5	2.01	2.5
Murray	63	20	38.4	1.18	2.5
Oakley	66	14	42.8	1.63	4.0
Ola	69	22	43.7	2.89	2.0
Orofino	74	28	46.0		
Paris	55	7	33.9	2.15	4.0
Payette	73	24	47.4	2.38	
Pearl				3.33	12.0
Pollock	69	30	47.4	2.07	
Poplar				1.40	
Porthill	60	22	40.2	1.13	
Priest River	65	23	41.1	3.00	1.8
Roosevelt	57	1	30.7	2.23	37.2
St. Maries	72	25	43.4	3.50	8.8
Salem				1.81	2.0
Soldier	55	5	31.0	2.78	4.5
Swan Valley	53	9	32.6		
Vernon	56	14	36.3	0.73	
Victor	58	18	35.3		17.5
Westlake				2.55	
Weston	65	20	41.4	2.31	5.0
<i>Illinois.</i>					
Albion	80	26	49.0	2.76	
Aledo	73	10	43.5	2.06	0.8
Alexander	77	17	47.6	1.75	T.
Antioch	77	9	37.9	2.65	3.0
Ashton	74	12	39.6	3.46	7.3
Astoria	74	14	44.9	1.95	T.
Aurora	76	13	40.3	2.33	6.0
Benton	82	27	52.2	2.27	
Bloomington	78	16	45.5	2.18	
Bushnell	76	14	45.7	2.28	
Cambridge	76	12	42.4	1.60	4.5
Carlinville	78	19	49.0	2.04	T.
Carrollton	80	19	50.6	2.26	
Charleston	80	23	47.4	1.80	T.
Chester	84 ^b	33 ^b	57.1 ^b	3.34	
Cisne				2.75	
Coatsburg	77	13	46.0	1.53	
Cobden	84	28	52.6	3.03	
Colchester	77	14	46.6	1.28	T.
Decatur	78	19	47.0	1.56	T.
Dixon	75	13	39.2	3.35	6.5
Efingham	81	24	48.7	2.67	
Equality	82	28	53.0	3.05	
Flora	79 ^a	26	49.8 ^a	2.32	
Friendgrove	76	28	49.4	4.03	
Galva	79	12	40.8	2.34	1.9
Greenville	80	22	49.2	2.14	
Griggsville	78	17	49.6	1.45	T.
Halfway	78	29	51.4	2.43	
Havana	76	15	46.2	1.69	
Henry	77	15	43.8	2.64	4.0
Hillsboro	80	21	49.4	1.63	
Hoopeston	77	20	44.8	1.24	2.0
Joliet	79	17	42.1	2.29	6.2
Kishwaukee	76	11	39.6	3.80	5.0
Knoxville	75	8	40.6	1.96	0.5
Lagrange	76	14	39.8	1.58	5.5
Lamar	76	12	44.6	1.25	T.
Laurens	76	10	39.4	3.06	5.0
McLeansboro	80	27	50.8	1.81	T.
Martinsville	78	24	45.2	1.82	
<i>Illinois—Cont'd.</i>					
Martinton	77	18	42.5	1.79	3.8
Mascoutah	78	25	47.8	2.89	
Mattoon	81	23	52.0	1.69	T.
Minonk	75	15	42.9	1.97	3.0
Monmouth	74	12	44.2	1.77	0.2
Morrison	75	12	41.0	3.13	6.7
Morrisonville	77	20	47.9	1.81	
Mount Carmel				3.14	
Mount Pulaski	77	18	46.6	1.53	
Mount Vernon	83	26	50.4	3.18	
New Burnside	80	28	52.9	2.72	
Olney	79	26	49.0	2.61	
Ottawa	78	12	43.7	2.09	4.0
Palestine	81	27	49.4	2.82	
Pana	77	20	46.0	1.49	T.
Paris	80	23	47.4	1.98	
Peoria				2.00	
Philo	78	21	44.8	1.10	
Plumhill	79	24	50.2	3.22	
Pontiac	77	18	44.2	2.17	3.0
Princeville	74	13	43.9	2.31	1.0
Rantoul	79	19	45.3	1.31	0.4
Raum	80	26	52.6	3.34	
Riley	74	10	38.4	2.73	5.6
Robinson	80	25	48.7	2.24	
Rushville	77	15	47.7	1.75	
St. Charles	77	12	39.8	2.73	6.0
St. John	81	27	51.2	2.77	
Shobonier	80	25	50.1	2.65	
Streator	75	16	40.8	2.20	
Sullivan	79	19	47.3	1.45	
Sycamore	77	11	39.0	2.98	5.0
Tilden	80	26	50.8	3.79	
Tiskilwa	74	13	41.0	2.73	3.3
Tuscola	78	20	45.4	1.26	T.
Urbana	77	20	44.0	0.75	
Walnut	76	15	42.3	3.63	5.4
Winchester	78	19	46.4	1.60	
Windsor	75	21	47.4	1.86	T.
Winnebago	76	10	38.6	3.77	9.0
Yorkville	75	14	40.2	2.38	6.0
Zion	75	13	38.6	2.20	0.6
<i>Indiana.</i>					
Anderson	77	22	45.1	2.71	
Angola	79	12	39.4	2.37	3.0
Auburn	80	7	38.8 ^a	2.00	
Bedford	82	26	51.4		
Bloomington	75	27	48.8	3.30	
Bluffton	82	8	42.2	2.20	2.5
Butler	81	25	48.9	2.54	
Cambridge City	79	22	43.6	2.23	0.2
Columbus	83	25	48.9	2.72	
Connersville	80	23	45.8	2.21	
Crawfordsville	80		46.8 ^a	1.66	
Delphi	82	21	42.9	2.05	3.2
Farmersburg	82	25	48.1	2.03	
Farmersburg	78	22	45.4	2.76	2.5
Fort Wayne	81	10	42.4	2.39	2.8
Franklin	81	23	47.4	2.36	
Greencastle	78	22	45.6	1.81	T.
Greenfield	79	23	46.6	2.23	
Greensburg	81	23	47.7	3.09	
Hammond	77	15	41.2	2.46	6.0
Hector	80	19	41.3	2.50	3.0
Holland	83	28	52.0	2.41	
Huntington	80	10	42.6	2.50	4.0
Jeffersonville	80	28	50.2	3.75	
Kokomo	80	23	43.2	1.54	2.0
Lafayette	79	23	43.8	1.48	2.0
Laporte	76	13	39.2	2.46	5.8
Logansport	81	19	41.8	1.19	
Madison	83	26	50.9	2.83	T.
Marengo	80	26	49.3	3.76	
Marion	82	18	44.1	2.61	4.7
Markle	80	7	41.9	3.10	3.0
Maury	80	20	45.1	2.48	T.
Moore Hill	80	27	49.0	2.52	
Mount Vernon	84	28	50.2	3.18	
Northfield	78	19	42.9	2.95	0.5
Paoli	83	25	50.2	2.83	
Princeton	82	27	50.4	2.84	
Rensselaer	78	16	42.6	1.59	5.0
Richmond	81	21	45.2	2.10	T.
Rochester	79	12	43.0	1.99	4.5
Rockville	80	23	46.4	1.96	
Rome	84	28	51.2	3.80	
Salem	83	25	50.8	2.92	T.
Scottdale	80	29	50.2	2.89	
Seymour	86	25	51.2	4.14	
Shelbyville	80	24	46.6	2.49	
South Bend	78	9	38.8	2.59	3.0
Syracuse	80	10	41.8	2.32	6.0
Terre Haute	80	27	49.0	1.60	
Topeka	82	12	39.4	2.11	
Valparaiso	77	14	41.9	2.37	
Vevay	83	26	49.8	2.50	
Vincennes	83	26	49.4	3.10	
Washington	82	27	49.0	2.58	
<i>Indiana—Cont'd.</i>					
Worthington	81	25	50.4	3.50	
<i>Indian Territory.</i>					
Ardmore	82	33	58.8	3.55	
Chickasha	89	32	60.2	3.50	
Durant	85	30	59.4	2.61	
Fairland	70	32	54.9	5.64	
Goodwater	82	35	58.8	6.21	
Hartshorne	86	31	58.8	3.18	
Healdton	86	21	58.4	3.68	
Holdenville	82	34	59.0	4.22	
Marlow	86	31	57.6	4.53	
Muskogee	80	29	56.9	7.15	
Okmulgee	82	31	57.7	6.10	
Pauls Valley	84	27	56.0	3.15	
Ravia	85	32	59.4	4.38	
South McAlester	88	34	60.4	3.52	
Tahlequah				9.89	
Vinita	79	28	55.6	5.85	
Webbers Falls	83	33	56.6	6.58	
<i>Iowa.</i>					
Afton	78	10	44.8	1.87	0.5
Albia	80	10	43.0	2.41	1.0
Algona	76	2	38.4	2.01	6.7
Allerton	79	9	45.2	3.38	0.3
Alta	78	7	39.6	1.51	6.0
Ames	70	9	41.9	2.88	5.1
Anama	76 ^a	7	44.0 ^a	2.30	7.0
Ames	78	11	42.8	0.50	1.0
Atlantic	78	9	42.7	3.54	3.0
Audubon	76	6	42.0	2.25	4.0
Baxter	77	12	45.4	1.62	T.
Bedford	67	8	39.9	2.14	6.8
Belleplaine	77	13	44.8	2.03	
Bonaparte	74	9	41.6	2.65	4.3
Boone	75	2	38.4	1.58	3.6
Britt				3.05	5.9
Buckingham	75	12	45.2	1.82	
Burlington	80	7	41.2	1.87	5.0
Carroll	71	10	39.9	2.25	
Cedar Rapids	77	9	44.2		

TABLE II.—Climatological record of cooperative observers—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Iowa—Cont'd.					
Massena.....	78	10	44.6	1.67	2.0
Monticello.....	79	6	41.3	2.71	7.2
Mount Pleasant.....	78	10	46.6	2.26	0.2
Mount Vernon.....	75	11	44.2	2.31	0.7
Muscatine.....	72	6	41.0	2.20	5.9
New Hampton.....	70	2	37.2	1.69	1.5
Newton.....	71	1	41.2	2.76	4.0
Northwood.....	65	1	37.0	2.35	8.5
Odebolt.....	79	8	42.0	1.43	7.0
Ogden.....	75	12	41.8	3.43	3.5
Oliver.....	69	10	39.8	2.52	7.0
Onawa.....	84	14	43.8	1.09	7.0
Osage.....	69	1	37.0	2.35	7.5
Oskaloosa.....	79	10	45.2	3.49	1.0
Ottumwa.....	74	13	45.2	3.38	0.7
Pacific Junction.....	82	15	45.2	0.77	0.7
Perry.....	77	10	42.8	2.49	4.8
Plover.....	75	9	39.4	1.75	4.5
Pocahontas.....	74	9	40.6	1.28	10.6
Red Oak.....	81	15	46.3	3.35	8.0
Ridgeway.....	71	1	38.0	2.15	6.0
Rock Rapids.....	78	10	40.8	2.78	4.3
Rockwell City.....	80	8	40.6	2.58	4.5
Sac City.....	77	7	41.0	1.50	0.5
St. Charles.....	80	9	45.1	2.15	6.0
Sheldon.....	80	7	39.9	2.58	4.3
Sibley.....	75	2	36.4	1.02	2.8
Sidney.....	83	16	47.2	3.35	4.5
Sigourney.....	76	9	43.8	2.20	2.0
Sioux Center.....	78	16	39.7	2.00	4.6
Stockport.....	74	7	37.6	1.18	4.0
Storm Lake.....	76	10	43.3	2.63	3.8
Stuart.....	82	15	46.4	2.03	4.0
Thurman.....	68	13	41.8	2.40	3.8
Tipton.....	75	7	41.7	1.79	4.0
Toledo.....	70	8	41.2	0.73	4.0
Vinton.....	72	22	42.3	1.96	3.0
Wapello.....	76	11	43.4	1.83	9.0
Washington.....	82	8	41.2	1.24	3.0
Washta.....	72	7	39.0	1.71	3.7
Waterloo.....	82	9	44.9	1.70	8.0
Waukegan.....	69	6	37.9	1.55	1.5
Webster City.....	74	5	41.7	3.67	0.5
West Bend.....	75	4	39.4	3.20	4.5
Whitten.....	73	5	39.4	1.98	3.0
Wilton Junction.....	74	9	42.0	1.57	3.0
Winterset.....	74	9	43.6	1.55	1.5
Woodburn.....	75	7	40.7	3.20	4.5
Zearing.....	75	7	40.7	3.20	4.5
Kansas.					
Abilene.....	82	16	46.0	0.96	3.0
Achilles.....	78	22	49.4	1.57	0.7
Anthony.....	80	21	47.8	3.81	1.0
Atchison.....	81	25	52.6	2.24	0.7
Baker.....	83	28	51.1	1.64	0.7
Blue Rapids.....	84	26	48.2	0.60	0.7
Burlington.....	76	15	44.6	4.54	0.7
Chapman.....	81	24	52.4	2.60	0.7
Clay Center.....	78	32	52.8	0.59	0.7
Colby.....	81	24	52.4	2.61	0.2
Columbus.....	85	28	52.6	1.68	0.2
Cottonwood Falls.....	86	26	52.2	1.20	0.2
Cunningham.....	80	26	52.6	3.94	0.2
Dresden.....	81	27	53.7	4.53	0.2
Eldorado.....	83	25	48.9	2.31	0.2
Ellinwood.....	81	27	52.6	2.80	0.2
Ellsworth.....	81	27	52.6	3.17	0.3
Emporia.....	82	20	48.7	1.80	0.3
Englewood.....	87	26	52.4	1.80	0.3
Enterprise.....	78	24	52.0	5.20	1.0
Eureka.....	94	28	57.6	3.22	1.0
Fall River.....	83	24	49.0	2.30	1.0
Farmersville.....	83	22	50.2	1.30	1.0
Fort Leavenworth.....	81	27	52.0	3.54	0.2
Fort Scott.....	87	23	46.8	1.11	0.2
Frankfort.....	79	23	49.0	2.87	0.5
Garden City.....	79	18	46.7	0.47	0.5
Grenola.....	79	24	48.0	2.25	1.0
Harrison.....	86	25	51.0	2.43	1.0
Horton.....	82	32	54.4	5.68	1.0
Hoxie.....	85	24	48.1	3.56	1.0
Hugoton.....	85	24	48.1	0.33	0.2
Hutchinson.....	85	22	49.8	0.61	0.2
Independence.....	81	20	48.6	0.98	0.2
Iola.....	86	21	47.4	0.96	0.2
Jetmore.....	79	26	51.2	4.38	0.2
La Crosse.....	84	18	44.4	0.50	0.2
Lakin.....	81	20	48.6	0.98	0.2
Larned.....	86	21	47.4	0.96	0.2
Lawrence.....	79	26	51.2	4.38	0.2
Lebanon.....	84	18	44.4	0.50	0.2
Lebo.....	81	26	51.6	3.18	0.2
Lindsborg.....	86	25	50.4	1.57	0.2
Macksville.....	85	27	52.0	2.17	0.2
McPherson.....	85	27	52.0	2.17	0.2
Kansas—Cont'd.					
Madison.....	81	24	52.8	3.90	1.0
Manhattan.....	84	27	51.8	2.45	0.1
Manhattan.....	84	27	50.4	2.60	0.3
Marion.....	82	26	50.2	2.74	0.3
Medicine Lodge.....	89	31	54.7	2.01	0.3
Minneapolis.....	86	27	50.2	0.93	1.0
Moran.....	80	29	52.8	2.61	1.0
Mouthope.....	78	25	48.5	0.71	1.0
New City.....	77	23	52.2	2.15	1.5
Norton.....	82	18	45.7	0.59	1.5
Norwich.....	83	29	53.2	0.86	1.5
Oberlin.....	81	25	48.6	3.12	3.5
Osage City.....	81	25	48.6	3.12	3.5
Osborne.....	78	30	53.6	5.47	1.0
Oswego.....	82	22	51.0	5.00	1.0
Ottawa.....	84	22	47.2	0.71	1.0
Phillipsburg.....	74	23	48.0	1.08	1.0
Plainville.....	80	27	53.0	2.58	1.0
Pleasanton.....	87	28	51.8	2.16	1.0
Pratt.....	86	26	47.6	1.09	1.0
Republic.....	85	29	53.8	3.29	1.0
Rome.....	86	24	50.2	0.74	0.5
Russell.....	85	27	52.2	1.21	0.5
Salina.....	81	31	52.8	5.57	0.5
Sedan.....	82	25	50.2	3.30	0.5
Toronto.....	80	22	47.4	0.67	0.5
Ulysses.....	80	21	47.2	2.73	0.5
Valley Falls.....	79	24	49.4	1.25	0.5
Viroqua.....	80	20	49.0	0.39	0.5
Wakeeney.....	80	20	49.0	0.38	0.5
Wakeeney (near).....	78	16	46.2	0.56	0.8
Wallace.....	79	30	53.0	3.49	0.8
Walnut.....	81	26	49.4	2.87	0.8
Wamego.....	82	28	53.6	3.35	0.8
Winfield.....	80	30	54.5	6.08	0.8
Kentucky.					
Alpha.....	81	27	50.4	3.10	0.8
Anchorage.....	83	29	52.8	4.94	0.8
Barstow.....	83	22	49.9	4.88	0.8
Beattyville.....	82	27	52.0	3.49	0.8
Beaver Dam.....	80	27	52.0	6.02	0.8
Berea.....	78	31	52.6	3.72	0.8
Blandville.....	81	30	54.2	3.53	0.8
Bowling Green.....	81	29	55.4	4.60	0.8
Burnside.....	81	30	55.0	3.26	0.8
Cadiz.....	86	30	54.7	3.58	0.8
Calhoun.....	80	26	51.2	5.40	0.8
Catlettsburg.....	83	28	51.0	3.32	0.8
Earlinton.....	81	28	53.5	5.15	0.8
Edmonton.....	80	24	49.9	6.04	0.8
Eubank.....	80	24	49.9	6.04	0.8
Falmouth.....	82	24	49.8	5.32	0.8
Farmers.....	80	29	51.0	4.11	0.8
Frankfort.....	83	32	56.6	1.95	0.8
Franklin.....	83	28	51.0	5.59	0.8
Greensburg.....	83	27	51.7	5.83	0.8
High Bridge.....	82	29	53.4	3.82	0.8
Hopkinsville.....	81	30	52.4	4.44	0.8
Irrington.....	82	28	53.6	4.87	0.8
Jackson.....	81	30	51.8	4.67	0.8
Leitchfield.....	81	30	51.8	4.67	0.8
Loretto.....	81	23	53.6	5.70	0.8
Manchester.....	82	27	52.0	6.03	0.8
Marion.....	81	30	53.2	4.01	0.8
Mayfield.....	78	31	53.5	3.15	0.8
Maysville.....	84	24	48.6	4.48	0.8
Middlesboro.....	79	28	53.2	3.42	0.8
Mount Sterling.....	79	27	49.8	6.86	0.8
Owensboro.....	83	31	52.2	3.25	0.8
Owenton.....	78	25	49.5	4.55	0.8
Paducah.....	82	32	54.8	3.75	0.8
Princeton.....	84	32	54.8	2.53	0.8
Richmond.....	80	27	51.8	6.36	0.8
St. John.....	79	28	50.4	4.66	0.8
Scott.....	80	25	48.4	3.34	0.8
Shelby City.....	82	25	51.0	6.60	0.8
Shelbyville.....	82	28	51.7	3.97	0.8
Taylorville.....	80	28	50.6	4.94	0.8
West Liberty.....	82	27	51.2	4.67	0.8
Williamsburg.....	82	30	53.8	3.05	0.8
Williamstown.....	80	24	50.6	3.30	0.8
Louisiana.					
Abbeville.....	85	44	65.5	4.61	0.8
Alexandria.....	86	41	64.4	8.49	0.8
Amite.....	82	39	62.8	8.75	0.8
Baton Rouge.....	86	43	64.1	11.12	0.8
Burnside.....	83	43	64.7	9.37	0.8
Calhoun.....	81	33	60.8	7.48	0.8
Cameron.....	79	49	64.2	5.18	0.8
Casipiana.....	84	40	62.3	4.71	0.8
Cheneyville.....	84	44	65.0	8.90	0.8
Clinton.....	82	39	63.4	5.73	0.8
Collinston.....	84	39	61.5	6.12	0.8
Covington.....	80	39	62.0	10.44	0.8
Donaldsonville.....	82	45	63.7	8.61	0.8
Emile.....	82	45	63.7	7.16	0.8
Farmerville.....	83	38	63.0	5.59	0.8
Louisiana—Cont'd.					
Franklin.....	86	40	65.2	7.00	0.8
Georgetown.....	84	36	62.7	8.10	0.8
Grand Coteau.....	84	34	65.0	4.17	0.8
Hammond.....	81	39	63.4	7.32	0.8
Houma.....	83	43	63.8	6.13	0.8
Jennings.....	83	44	64.8	5.22	0.8
Lafayette.....	82	44	64.4	7.00	0.8
Lake Charles.....	84	45	63.6	4.91	0.8
Lakeside.....	82	43	64.1	4.09	0.8
Lawrence.....	82	40	61.8	9.72	0.8
Leesville.....	84	38	61.8	5.63	0.8
Libertyville.....	84	38	61.8	5.63	0.8
Logansport.....	83	34	59.0	5.45	0.8
Mansfield.....	86	41	62.6	5.10	0.8
Melville.....	83	36	60.4	6.03	0.8
Minden.....	87	35	63.0	6.56	0.8
Monroe.....	82	47	65.4	4.50	0.8
Morgan City.....	84	44	64.0	5.11	0.8
New Iberia.....	89	34	59.6	5.88	0.8
Opelousas.....	76	44	61.3	2.98	0.8
Plain Dealing.....	84	45	64.9	5.05	0.8
Port Eads.....	85	46	64.0	5.20	0.8
Rayne.....	82	34	60.6	6.51	0.8
Reserve.....	85	35	61.4	7.60	0.8
Robeline.....	84	44	63.8	6.25	0.8
Ruston.....	84	44	63.8	6.25	0.8
St. Francisville.....	84	44			

TABLE II.—Climatological record of cooperative observers—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
<i>Massachusetts—Cont'd.</i>					
East Templeton #1	68	7	33.4	2.66	5.0
Fall River	65	10	35.8	2.74	1.2
Fitchburg	69	6	33.4	3.96	8.0
Framingham	69	5	34.1	3.21	4.8
Groton	68	3	31.8	3.13	10.0
Hyannis				3.26	1.0
Jefferson				4.27	8.0
Lawrence	67	4	33.0	2.98	9.5
Leominster				3.56	8.5
Lowell	72	2	34.4	3.71	
Ludlow Center	70	5	35.7	3.33	3.0
Middleboro	67	8	35.5	2.40	1.5
Monson	75	1	33.6	4.56	1.2
New Bedford	68	9	34.6	2.88	1.0
Pittsfield				3.50	8.0
Plymouth #1	66	13	36.2	2.87	3.0
Princeton				4.14	10.0
Provincetown	64	17	35.4	2.45	0.5
Salem				2.71	7.0
Somerset #1	70	6	35.9	2.91	1.5
Sterling				3.74	6.5
Taunton	67	5	34.8	2.53	
Webster				2.78	2.0
Westboro	72	3	34.8	3.85	5.0
Weston	69	5	34.4	2.79	4.8
Williamstown	74	1	30.8	2.74	5.2
Winchendon				2.88	7.5
Worcester	72	9	35.2	2.65	5.2
<i>Michigan.</i>					
Adrian	85	4	39.2	1.19	
Agricultural College	78	8	35.4	3.15	T.
Allegan	78	9	36.5	2.67	3.0
Alma	77	3	34.5	4.50	8.5
Ann Arbor	80	8	37.6	1.64	0.2
Arbela	78	4	34.0	2.71	2.5
Baldwin	74	7	30.6		2.0
Ball Mountain	77	7	34.7	1.28	0.5
Baraga				0.85	6.0
Battlecreek	64	12	32.5	2.81	T.
Bay City	78	0	33.0	4.35	9.0
Benzon	71	1	30.9	2.63	3.0
Berlin	76	2	32.8	1.49	1.9
Berrien Springs	79	10	38.4	2.57	4.5
Big Rapids	76	9	30.2	2.30	7.0
Birmingham	80	15	38.8		
Bloomington	74	5	37.4	3.00	T.
Calumet	55	4	26.5	2.26	7.5
Carsonville	78	13	38.0	0.90	8.0
Cassopolis	72	9	37.6	2.60	2.0
Charlevoix	69	11	26.5	1.07	2.0
Charlotte	87	7	38.5		
Chatham	57	19	23.0	1.11	8.3
Cheboygan	61	11	25.2	1.95	5.0
Clinton	81	3	38.4	1.40	1.0
Coldwater	78	11	40.1	3.64	3.0
Deer Park	56	19	20.8	1.80	7.0
Detour	52	16	21.6	4.56	9.0
Dundee	80	2	39.7	1.82	2.5
Eagle Harbor	54	10	24.7	2.55	
East Tawas	77	3	28.8	4.07	6.5
Eloise	80	6	37.8		
Ewen				0.20	2.0
Fennville	76	8	35.8	3.05	2.0
Fitchburg	78	2	35.7	1.82	T.
Flint	78	1	35.1	2.63	5.5
Frankfort	78	2	29.5		
Gladwin	77	8	31.3	3.65	3.0
Grand Haven	70	9	33.5	1.12	
Grand Marais	53	19	21.8	3.05	17.5
Grape	80	6	38.0	1.35	2.5
Grayling	74	15	27.8	3.10	0.5
Hagar	73	8	36.6	3.72	3.0
Harbor Beach	76	3	30.8	1.67	1.0
Harrison	73	7	30.0	2.80	3.0
Harrisonville	60	5	27.6	3.96	5.0
Hastings	79	9	37.1	3.08	1.0
Hayes	71	7	31.4	2.87	5.0
Hillsdale	77	9	38.0	2.25	1.5
Howell	78	6	38.0	1.50	T.
Humboldt	59	34	19.8		
Ionia				3.48	2.6
Iron Mountain	68	9	27.9	1.76	5.0
Iron River	70	22	26.4	3.55	4.0
Ironwood	66	15	27.8	0.53	1.0
Ishpeming	62	16	23.7	0.95	6.0
Ivan	72	10	28.8	1.75	2.5
Jackson	78	9	38.4	1.95	1.0
Jeddo	76	6	34.0	1.22	3.1
Kalamazoo	77	10	38.8	1.60	1.0
Lake City				1.75	
Lansing	78	9	37.3	2.54	1.1
Lapeer	80	4	35.4	0.76	4.2
Ludington	63	2	32.4		1.0
MacKinnac Island	59	10	24.8	6.79	9.4
MacKinnaw City	63	10	25.8	3.00	6.0
Manistee	68	1	31.8		
Marine City	73	1		1.35	
Menominee	67	1	29.9	1.23	T.
<i>Michigan—Cont'd.</i>					
Midland	70	1	33.6		
Montague	68	0	32.0	1.95	2.0
Muskegon	69	4	34.4	2.50	3.5
Newberry	49	23	19.2		
Old Mission	71	3	28.8	2.25	1.7
Olivet	75	8	36.4	2.25	2.0
Omer	72			2.43	2.0
Onaway	73	10	27.5	1.17	6.0
Ovid	77	8	35.4	3.17	4.5
Owosso	79	7	37.8	2.0	
Petoskey	73	5	27.3	1.01	6.0
Plymouth	82	6	37.4		
Port Austin	78	2	29.0	1.20	2.0
Powers	66	7	27.2	2.0	
Reed City	74	6	30.8	2.42	2.0
Roscommon	74	18	26.5	1.20	2.0
Saginaw (W. S.)	77	4	34.5	3.16	10.1
St. Ignace	61	14	25.4		
St. Johns	79	8	37.8	3.60	7.5
Slocum	74	1	33.5	2.57	
Somerset	75	4	36.6		
South Haven	75	7	34.4	2.93	2.0
Stanton	84	1	32.4	1.33	5.0
Thomaston	67	21	26.2	0.30	3.0
Thornville	76	2	35.3	1.21	4.0
Traverse City				1.79	T.
Vassar	78	5	34.7	2.75	8.5
Waspi	78	2	37.2	3.12	2.0
Waverly	75	6	35.3	1.61	0.5
Webberville	77	4	36.1	2.53	0.2
West Branch	70	5	28.2	2.43	4.0
Westmore	56	20	22.3	2.00	6.0
Whitefish Point	48	26	18.0	2.32	10.4
Ypsilanti	78	1	36.2	1.32	0.7
<i>Minnesota.</i>					
Albert Lea	73	2	36.4	1.87	7.0
Alexandria	62	3	32.6	0.90	1.2
Amboy	74	11	38.6	1.79	3.5
Angus	62	25	28.2	1.40	3.0
Ashby	66	2	33.4	0.75	1.0
Beardsley	71	2	35.6	0.41	6.3
Beaulieu	63	11	30.2	0.74	T.
Bemidji	61	13	29.8		
Bird Island	68	3	35.6	1.00	4.5
Caledonia	68	1	35.6	1.53	4.2
Collegeville	63	2	33.7	0.50	2.1
Crookston	60	15	28.0	1.85	6.5
Currie	74	5	37.7		
Detroit	58	8	29.8	0.62	T.
Faribault	73	1	37.8	1.90	2.0
Farmington	65	3	35.2	1.54	3.0
Fergus Falls	63	4	31.9	0.39	1.1
Floodwood	63	23	30.3		
Glencoe	67	2	36.0	0.26	3.0
Grand Meadow	69	4	35.6	2.88	6.0
Hallock	63	27	26.4	2.40	2.7
Hickley	64	1	33.0		
Hovland	55	28	23.4	1.90	4.0
Lake Winnibigoshish	59	18	26.8	1.07	3.3
Leech	63	15	28.3	0.67	T.
Long Prairie	64	3	33.0	0.55	1.2
Luverne	77	8	38.3	1.63	2.0
Mankato				1.67	3.0
Mapleplain	66	0	34.8	1.08	2.7
Milaca	65	3	33.2	0.35	0.5
Milan	71	0	35.6	1.58	12.3
Montevideo	71	4	35.4	0.81	5.0
Mora	64	4	32.8	0.80	T.
Morris	66	0	33.4	0.68	6.1
Mount Iron	62	25	26.7	1.61	5.0
New London	70	3	32.8	1.03	6.0
New Richland	72	4	37.8	1.40	3.0
New Ulm	69	5	36.6	2.49	2.2
Park Rapids	59	9	28.1	0.71	2.1
Peterson				1.87	2.9
Pine River	65	8	30.0	0.90	1.5
Pokegama Falls	32			1.78	6.3
Pratt	68	2	37.8	2.07	4.0
Redwing				1.74	0.1
Reeds				1.26	1.8
Rolling Green	70	6	36.8	2.15	4.0
St. Charles	68	3	34.2	1.62	3.0
St. Cloud	67	1	35.0	0.60	3.0
St. Peter	71	3	38.4	2.25	3.5
Sandy Lake Dam	64	10	30.0	0.54	
Shakopee	68	2	36.4	1.23	2.0
Two Harbors	63	17	28.3	0.94	0.3
Wabasha	73	3	38.1	1.61	1.0
Wadena	62	5	32.0	0.31	1.2
Willow River	62	8	30.3	0.55	T.
Winnebago	76	1	38.2	1.77	6.4
Winona	72	4	34.7	1.72	1.2
Worthington	75	5	37.2	1.38	8.0
Zumbrota	68	2	36.0	1.87	T.
<i>Mississippi.</i>					
Aberdeen	80	36	58.8	4.05	
Agricultural College	82	31	58.2	6.98	
Austin	83	37	59.6	7.64	
<i>Mississippi—Cont'd.</i>					
Batesville	81	34	57.4		
Bay St. Louis	80	41	62.8		
Biloxi	83	44	64.5		
Booneville	77	39	57.6		
Brookhaven	84	40	62.5		
Canton	83	36	62.1		
Columbia				7.03	
Columbus	82	33	59.0		
Corinth	80	35	55.8		
Crystal Springs	84	38	61.6		
Duck Hill	84	34	59.0		
Edwards	83	38	61.0		
Enterprise				3.30	
Fayette	86	34	61.4		
Fayette (near)				4.95	
Greenville	81	35	59.8		
Greenwood	84	33	58.4		
Hattiesburg				5.80	
Hazlehurst	82	40	61.8		
Hernando	79	34	57.4		
Holly Springs	82	36	58.1		
Jackson	83	36	61.0		
Kosciusko	84	35	71.0		
Lake	83	34	59.8		
Lake Como	84	34	62.0		
Laurel	84	37	61.4		
Leakesville	83	32	60.2		
Louisville	82	35	59.5		
McNeill				9.67	
Magee	88	40	60.8		
Magnolia	83	38	62.0		
Merrill				7.38	
Natchez	87	44	65.2		
Nitta Yuma	85	39	60.2		
Okolona	85	35	59.8		
Patmos				5.85	
Pearlington	81	39	63.4		
Pecan	80	39	63.4		
Pittsboro	84	35	59.2		
Pontotoc	79	35	58.8		
Poplarville	81	36	63.6		
Port Gibson	85	36	63.2		
Porterville	83	38	60.4		
Ripley	84	32	55.2		
Shelby	84	37	60.2		
Shochoe	82	38	62.6		
Shubuta				5.04	
Suffolk	84	37	62.5		
Tehola	83	39	62.0		

TABLE II.—Climatological record of cooperative observers—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.		Stations.	Temperature. (Fahrenheit.)			Precipitation.		Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.		Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.		Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Missouri—Cont'd.						Montana—Cont'd.						Nebraska—Cont'd.					
Lebanon	80	28	52.2	3.24		Toston	68	12	40.6			Oakdale	79	16	40.2	0.75	4.6
Lexington	80	21	51.0	1.82		Troy	72	21	42.3	1.34	1.0	Odell				0.53	
Liberty	80	21	50.6	4.77		Twin Bridges	68	8	36.8	0.20	2.0	Ord				1.11	
Lockwood	77	29	51.4	4.90		Utica	64	—1	38.4	0.62	7.5	Osceola				0.45	
Louisiana	80	18	49.4	1.34		Virginia City	64	10	38.3	0.69	1.7	Palmer				1.11	2.5
Macon	80	16	49.2	1.73		Warrick				0.63	4.9	Palmyra	82	20	45.6	1.50	
Marblehill	83	28	53.0	2.94		Wolf Creek	66	1	37.6	0.77	3.5	Pawnee City	82	20	48.2	2.23	
Marshall	76	19	50.0	1.36		Wolsey	60	—4	30.9	0.54	14.0	Plattsmouth	82	13		0.23	1.0
Maryville	79	15	45.3	1.59		Yale	70	7	38.9	0.80	6.5	Plymouth	85	20	47.5	0.62	
Mexico	82	13	49.4	1.17	0.1							Purdum	76	18	42.3	2.80	4.0
Miami	72	20	46.8	1.07		Nebraska.						Ravenna	91	20	44.0	0.88	1.3
Monroe	79	15	47.0	1.26		Agate	68	14	39.0	0.22	2.6	Republican				0.35	2.0
Montreal	82	22	51.0	2.43		Agee	76	16	38.1	3.69	5.5	Rulo				1.58	
Mountaingrove	76	29	51.4	4.91		Albion	80	17	42.0	1.47	4.0	St. Libory				0.86	0.5
Mount Vernon	80	27	52.6	6.42		Alliance	77	12	43.6	0.10	1.0	St. Paul	82	19	24.2	1.02	2.6
Neosho	79	27	53.8	6.27		Alma	84	21	46.4	0.61	1.5	Santee	79	11	46.8	3.34	4.0
New Haven	80	23	51.1	1.94		Ansley	77	18	41.5	1.15	2.0	Schuyler				0.87	1.0
New Madrid				3.61		Ashland	84	18	46.3	0.56	0.2	Seneca				0.41	3.0
New Palestine	88	32	51.5	0.70		Ashton				1.02		Seward	82	20	48.2	1.33	
Oakfield	79	22	50.8	3.02		Auburn	83	18	47.8	1.82	T.	Smithfield				0.80	
Olden	80	25	53.0	4.36		Aurora	83	20	45.0	0.35		Springview	74	16	42.3	1.32	2.0
Oregon	80	15	48.1	2.71		Bartley	82	18	45.3	0.32	2.0	Stanton	82	12	42.3	1.00	4.0
Oscola				2.95		Beatrice	85	22	48.6	0.79		Strang				1.25	T.
Pine Hill				4.41		Beaver	79	25	46.6	0.70	1.2	Stratton				1.68	5.0
Princeton	80	14	46.8	4.11		Bellevue				0.77	1.0	Stromsburg				0.58	
Protom	79	30	54.6	4.84		Blair	83	12	45.0	0.98		Superior	84	24	45.6	0.88	
Rockport				1.65		Bluehill				0.83	0.6	Taberock				1.54	
Rolla				3.89		Bradshaw				0.81	T.	Tecumseh	83	17	46.4	0.99	
St. Charles	79	22	50.1	2.83		Bridgeport	78	11	41.6	0.81		Tekamah	84	14	44.8	1.43	2.5
St. Joseph				3.48		Broken Bow	77	18	42.0	1.10		Turlington	82	16	46.8	0.78	T.
Saxville				5.43		Burchard				0.79		University Farm	85	18	47.5	0.72	
Sedalia	82	22	51.9	0.82		Burge				1.38	3.2	Wahoo				1.88	1.0
Seymour	78	28	51.5	6.25		Burwell				0.40	4.0	Wakefield	82	13	41.7	1.75	5.5
Sikeston	80	31	53.7	4.25		Callaway	77	19	43.2	0.61	T.	Wallace				2.95	
Steffenville	78	15	47.9	1.41		Chester				1.50		Wannetta				2.45	
Sublett	80	13	46.2	2.10		Columbus	84	17	42.2	0.64	T.	Weeping Water				0.50	0.4
Trenton	76	16	48.0	3.38		Crawford				0.50	3.0	Westpoint	84	14	44.0	1.41	3.0
Unionville	80	10	43.8	4.01	0.2	Crete	85	19	47.2	1.02		Wilber				1.08	
Versailles	85	20	52.5	1.78		Culbertson	72	20	44.4	1.51	6.0	Wilsonville				1.22	5.0
Warrensburg	83	23	52.2	1.89		Curtis	77	20	42.0	1.15	2.0	Winnebago	84	7	42.2	1.24	4.2
Warrenton	79	20	47.6	1.51		David City	82	17	44.0	1.56	1.1	Wisner				0.13	3.5
Warsaw	83	15	50.2	2.23		Dawson	82	18	49.2	1.38	T.	Wymore				0.45	
Willow Springs	76	25	50.5	5.24		Duff				4.65	4.0						
Windsor	82	21	51.0	1.40	0.1	Dunning				2.90	4.0						
Zeitonia	80	26	50.1	2.67		Edgar				0.29	T.						
Montana.						Ericson				1.69	1.8	Nevada.					
Adel	64	—3	34.9	0.98	9.5	Ewing				2.66	4.0	Amos	71	10	43.8	1.72	
Alzada				0.20	2.0	Fairbury	88	23	47.0	0.64		Austin	56	16	39.5	1.51	
Anaconda	67	10	37.2	0.95	9.0	Fairmont	77	22	43.4	1.27	T.	Battle Mountain				0.28	
Augusta	70	—7	37.0	2.27	15.0	Fort Robinson	70	14	39.6	0.38	2.8	Belmont	56	8	34.6	1.06	
Billings	78	13	43.5		9.5	Franklin	84	20	46.8	0.20	0.5	Beowawe	67	25	44.2	T.	
Boulder	68	8	37.8	0.77	2.9	Freemont	83	13	44.6	0.93	1.0	Caliente	82	19	50.1	1.40	
Bossman	60	8	35.8	0.77	5.4	Fullerton				0.77	2.5	Candelaria	69	18	44.2	0.76	
Butte	60	12	37.0	1.15	11.5	Geneva	85	21	46.4	0.55	T.	Carson City	70	16	42.8	1.61	2.2
Canyon Ferry	62	10	38.0	0.21	1.6	Genoa (near)	82	15	43.8	1.34	4.5	Cranes Ranch				1.36	
Cascade	75	1	42.0	0.55	8.8	Gering	78	16	43.0	0.69	0.3	Dyer	70	12	43.2	1.00	
Chester	65	9	36.5	0.05	0.5	Gordon				0.65	5.0	Elko	72	14	42.2		5.8
Chinook	72	1	39.8	T.		Gothenburg	79	18	44.0	0.88		Eureka	62	10	37.8	1.10	8.8
Chouteau	69	6	37.8	0.56	4.6	Grand Island	84	20	45.5	0.73	T.	Geyser	66	10	38.2	1.39	1.5
Clearcreek	68	8	40.6	0.90	9.0	Grant	88	18	43.8	2.40	3.0	Golconda				1.30	0.5
Columbia Falls	72	14	38.4	0.34	T.	Greely				0.55	2.0	Halleck	64	6	40.6	1.98	9.0
Crow Agency	63	14	42.2	1.80	14.0	Guide Rock				1.22	0.2	Hawthorne	75	20	50.4		
Culbertson	68	0	33.4	0.26		Haigler				2.30		Humboldt	65	19	42.0	0.43	T.
Dayton	68	23	40.2	0.59	4.5	Halsey	78	18	42.1	2.96		Lewers Ranch	71	15	44.4	5.45	10.5
Decker	78	14	40.4	0.70	1.0	Hartington	80	10	40.8	1.56	5.2	Lovelocks	66	28	44.1	T.	
Deer Lodge	58	10	35.2			Harvard	82	20	43.6	0.73	T.	Martins				1.36	
Dillon	66	10	38.2	2.23	11.1	Hastings	83	24	46.6	0.91	4.0	Mill City	60	24	39.2	0.97	0.0
Elk Lake	67	6	36.7	1.03	T.	Hayes Center				2.52	4.0	Palisade	69	12	41.0	1.39	1.0
Fallon	71	10	39.6	T.		Hay Springs	72	15	40.0	2.56	15.0	Pioche	68	4	36.8	2.80	1.7
Forsyth	72	13	42.6	0.04	1.0	Hebron	86	25	47.0	0.85	T.	Potts	59	8	35.8	2.35	5.0
Fort Benton	68	8	39.4	0.40	3.0	Hendley				0.83	4.0	Reno State University	66	12	42.9	1.11	0.8
Fort Harrison	64	1	37.3			Holbrook				1.01	3.0	San Jacinto	63	10	38.0	1.63	
Fort Logan	60	—8	30.0		12.5	Holdrege	78	22	44.5	0.20	1.0	Sodaville	80	25	52.4	3.35	
Glasgow	69	—1	34.8	0.65		Holly				2.43	7.2	Tecoma	63	13	39.0	1.23	
Glendive	65	3	34.1	0.41		Hooper	80	18	42.7	1.40	1.9	Toano				1.76	3.0
Grayling	52	—6	27.8	1.31	18.0	Imperial	70	19	40.8	3.82	3.5	Wabaska	70	10	44.6	0.23	
Great Falls	71	9	40.8	0.66		Johnstown				1.41	4.0	Wadsworth	72	19	46.4		
Hamilton	68	15	41.1	0.51	15.0	Kearney	82	22	45.4	0.88	1.0	Wells	55	14	38.8	1.32	2.0
Hayden (near)	68	16	41.0	0.41	T.	Kennedy	75	15	42.4	1.44	10.0	Wood	65	11	39.4	2.35	
Jordan	67	6	39.2	0.00		Kimball	70	15	40.6	1.87	3.5	New Hampshire.					
Lakeview				3.30	13.0	Kirkwood	77	15	42.3	2.49	6.5	Alstead	61	—8	29.0	2.00	10.0
Lame Deer	71	13	40.8	1.15	5.0	Leavitt	85	13	43.6	1.07	0.5	Berlin Mills	64	—19	26.8	2.91	1.5
Livingston	68	8	39.6	0.77	4.0	Level				1.50	2.0	Bethlehem	65	—5	27.6	2.52	6.0
Lewistown	71	7	38.4	0.55	5.5	Lexington	80	20	43.0	0.78		Brookline	64	—10	32.3	3.91	12.2
Lodgepole	70	11	39.0	0.51	T.	Lodgepole	73	16	40.9	1.45	2.0	Chatham	61	—9	26.4	1.00	5.0
Lodgegrass	60	1	33.4	1.08	12.5	Loup	80	16	41.0	0.94	2.0	Durham	62	1	31.0	2.00	9.0
Missoula	65	13	40.7	2.22	11.0	McCook				2.80	3.0	Franklin Falls	66	0	29.9	2.70	9.0
Ovando	63	6	36.1	1.79	12.8	McCool											

TABLE II.—Climatological record of cooperative observers—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.		Stations.	Temperature. (Fahrenheit.)			Precipitation.		Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.		Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.		Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
<i>New Jersey—Cont'd.</i>						<i>New York—Cont'd.</i>						<i>New York—Cont'd.</i>					
Bergen Point.....	78	12	39.2	3.97	3.0	Arcade.....	79	-14	29.0	1.28	10.8	West Berne.....	83	-5	30.8	2.60	11.0
Beverly.....	80	9	41.0	4.24	4.5	Athens.....	82	6	34.4	2.60	7.5	Westfield.....	76	-6	31.7	2.13	7.0
Blairstown.....	85	4	37.7	4.09	4.0	Atlanta.....	82	-11	33.3	2.05	10.5	Windham.....	76	-6	31.7	2.30	9.5
Bridgeton.....	81	15	44.2	4.58	T.	Atwater.....	83	0	33.2	2.71	7.6	<i>North Carolina.</i>					
Canton.....	80	24	42.4	3.00	T.	Auburn.....	81	2	32.0	3.71	5.0	Brevard.....	76	22	50.4	2.95	
Cape May C. H.....	82	4	35.4	3.15	2.0	Avon.....	68	-2	29.8	1.43	5.0	Brewers.....	78	24	48.8	2.27	
Charlotteburg.....	82	8	37.4	3.81	2.5	Baldwinsville.....	75	-5	28.9	2.20	2.0	Bryson City.....	82	21	54.4	3.52	
Chester.....	80	13	43.0	4.17	T.	Ballston Lake.....	78	4	36.2	2.30	11.4	Calybeate Springs.....	80	28	52.4	2.51	
Clayton.....	85	6	42.2	4.02	1.2	Bedford.....	81	-9	31.7	3.36	6.0	Catawba.....	76	23	50.2	1.19	
College Farm.....	83	17	35.5	3.42	2.0	Berlin.....	82	-15	32.7	1.95	5.0	Chapelhill.....	80	23	50.2	2.43	
Dover.....	83	11	40.4	4.07	4.0	Blue Mountain Lake.....	75	-5	29.6	1.60	5.0	Currituck.....	76	23	50.2	2.44	
Elizabeth.....	76	10	38.5	4.07	2.0	Bolivar.....	81	4	33.6	3.34	13.9	Eagletown.....	80	24	52.0	2.50	
Englewood.....	83	6	40.5	3.78	4.5	Bouckville.....	63	-5	25.6	2.50	5.0	Edenton.....	85	29	57.0	2.43	
Flemington.....	81	14	42.3	4.22	0.5	Brockport.....	82	-5	33.8	2.15	9.6	Fayetteville.....	83	27	54.8	2.86	
Friesburg.....	82	11	42.2	4.62	2.5	Cape Vincent.....	72	-17	27.0	1.50	0.5	Goldsboro.....	79	30	52.2	2.22	
Hightstown.....	82	9	42.4	5.06	4.0	Carmel.....	80	2	31.8	4.51	0.5	Graham.....	78	24	51.4	2.25	
Imlaystown.....	83	9	40.7	4.02	3.0	Carvers Falls.....	72	-17	27.0	2.05	10.0	Greensboro.....	74	26	50.6	1.36	
Indian Mills.....	83	7	40.4	3.67	4.5	Chatham.....	81	-1	33.5	3.36	8.0	Henderson.....	79	27	54.4	3.41	
Lakewood.....	83	7	40.4	3.67	4.5	Chazy.....	72	-8	27.4	0.76	4.3	Hendersonville.....	69	32	50.6	2.57	
Lambertville.....	83	-7	33.5	3.55	1.0	Coeysmans.....	78	3	33.0	3.12	8.0	Henrietta.....	79	27	54.4	1.13	
Layton.....	81	9	41.0	4.24	4.8	Cold Spring Harbor.....	73	-7	28.2	4.11	1.0	Horse Cove.....	74	31	52.9	4.15	
Moorestown.....	79	10	39.4	3.80	5.2	Cooperstown.....	80	-9	30.6	2.48	9.5	Hot Springs.....	73	27	48.0	1.12	
New Brunswick.....	83	10	40.8	3.93	4.7	Cortland.....	68	13	36.8	3.28	6.0	Jefferson.....	88	25	56.6	2.52	
Newton.....	84	3	35.8	4.53	2.0	Cutchogue.....	79	-10	26.7	3.85	T.	Kinston.....	76	24	50.4	2.08	
Oceanic.....	78	12	39.8	4.03	3.0	Deansboro.....	70	-14	28.7	1.85	3.0	Lexington.....	77	27	52.2	1.92	
Paterson.....	81	12	40.6	4.22	2.0	Dekalb Junction.....	79	-10	26.7	2.77	5.2	Lincolnton.....	65	22	43.1	2.25	
Phillipsburg.....	85	8	38.8	3.79	4.6	De Ruyter.....	80	2	31.8	3.02	6.7	Louisburg.....	78	30	53.0	3.16	
Plainfield.....	82	10	39.0	3.73	3.7	Elba.....	79	-22	26.0	0.90	6.0	Lumberton.....	85	30	56.2	2.39	
Pleasantville.....	80	3	36.7	3.83	2.0	Elmhurst.....	81	-3	31.6	2.87	4.0	Manteo.....	75	30	51.3	5.22	
Rancocas.....	80	15	43.8	3.55	T.	Faust.....	72	1	30.8	0.83	3.0	Marion.....	79	28	54.1	2.32	
Rivervale.....	73	15	38.0	3.45	3.4	Fayetteville.....	80	-14	30.6	2.68	9.5	Marshall.....	76	29	51.7	1.34	
Salem.....	81	9	39.6	3.96	4.5	Franklinville.....	65	-8	27.8	2.82	11.3	Moncure.....	79	25	52.2	2.37	
Sandyhook.....	81	9	39.6	3.96	4.5	Gansevoort.....	68	-4	27.7	2.77	5.2	Monroe.....	79	24	54.2	1.83	
Somerville.....	76	9	38.2	4.09	4.0	Gansevoort.....	70	-2	28.9	3.32	17.5	Morgantown.....	76	29	52.6	1.46	
South Orange.....	86	2	36.6	3.95	1.5	Gloversville.....	66	-7	28.2	2.04	10.0	Mountairy.....	76	24	49.5	1.58	
Sussex.....	75	13	37.4	3.00	2.0	Greenfield.....	79	-10	29.9	2.90	12.8	Mount Holly.....	83	21	54.1	0.84	
Toms River.....	79	17	43.8	3.00	2.0	Greenwich.....	73	-2	29.6	1.97	9.0	Murphy.....	82	25	55.6	3.39	
Trenton.....	78	10	39.8	4.66	1.5	Griffin Corners.....	84	-9	32.4	2.66	5.0	Nashville.....	82	25	55.6	2.67	
Tuckerton.....	82	13	42.4	4.50	1.0	Hackensack.....	81	-19	27.4	0.74	1.3	Newbern.....	69	26	47.0	1.33	
Vineland.....	78	13	41.6	3.48	1.0	Haskinville.....	80	-13	32.8	1.63	8.0	Patterson.....	80	32	56.6	2.29	
Woodbine.....	78	13	41.6	3.48	1.0	Hemlock.....	82	-10	33.8	1.54	.....	Pinehurst.....	78	24	52.7	1.93	
Woodstown.....	76	30	52.4	1.85	T.	Hunt.....	81	-19	27.4	3.05	9.0	Ramseur.....	78	28	51.4	1.89	
<i>New Mexico.</i>						Indian Lake.....	82	-3	32.8	2.20	22.0	Reidsville.....	77	24	51.2	1.65	
Alamogordo.....	77	30	50.2	2.90	T.	Ithaca.....	80	-11	29.3	3.06	11.7	Salem.....	80	26	53.5	1.33	
Albany.....	75	30	49.0	.....	3.0	Jamestown.....	63	-7	27.8	2.54	6.5	Salisbury.....	78	26	51.0	2.08	
Albuquerque.....	76	28	48.2	5.35	.....	Jeffersonville.....	85	1	33.2	3.03	1.0	Saxton.....	79	25	53.2	2.41	
Arbela.....	76	20	48.4	1.28	3.0	Keene Valley.....	78	0	31.4	1.21	2.7	Scotland Neck.....	80	27	54.2	4.35	
Bellbranch.....	80	25	54.8	2.07	2.0	Lake George.....	70	0	28.0	2.40	12.5	Selma.....	80	28	53.2	1.59	
Bloomfield.....	72	25	45.5	1.79	2.0	Le Roy.....	72	3	31.4	1.89	8.2	Settle.....	78	25	53.2	2.82	
Brice.....	81	31	53.8	3.36	.....	Liberty.....	72	-10	27.2	3.42	2.3	Sloan.....	83	20	54.8	1.89	
Carlsbad.....	85	29	57.3	3.39	10.0	Littlefalls, City Res.....	70	0	28.0	1.64	4.0	Snowhill.....	82	30	56.7	2.91	
Carmarvon.....	71	20	43.6	5.42	21.0	Lockport.....	72	-10	27.2	2.63	10.5	Southern Pines.....	78	34	56.4	3.20	
Claudcroft.....	65	15	34.4	2.12	21.0	Lyndonville.....	83	-4	33.8	1.64	6.0	Statesville.....	80	25	53.3	1.50	
Deming.....	78	28	49.8	2.15	3.0	Lyons.....	78	10	35.6	1.28	6.0	Tarboro.....	84	22	56.1	3.51	
Dorsey.....	73	22	43.4	2.57	3.0	Middletown.....	76	2	32.4	3.21	3.5	Washington.....	80	25	55.6	3.66	
Eagle Rock Ranch.....	69	19	42.2	1.75	5.0	Mohawk Lake.....	68	-8	27.2	2.84	4.0	Waynesville.....	76	27	51.5	1.98	
Elizabethtown.....	55	4	33.5	1.44	5.0	Morin.....	78	7	37.3	1.96	1.0	Weldon.....	83	21	51.3	4.39	
Elk.....	77	25	48.1	3.00	3.0	Mt. Hope.....	78	7	37.3	4.56	7.0	Whiteville.....	82	29	57.3	2.70	
Engle.....	75	29	49.4	4.40	.....	New Hope Valley.....	77	-15	27.1	3.23	8.0	<i>North Dakota.</i>					
Estancia.....	66	16	44.0	0.38	3.0	New Lisbon.....	68	-15	27.1	4.26	1.0	Amenia.....	66	-9	33.4	0.10	T.
Fairview.....	77	20	48.0	1.90	3.0	North Hammond.....	77	-15	27.1	3.79	8.0	Ashley.....	64	-1	33.2	0.51	5.0
Fort Bayard.....	68	24	43.9	4.33	12.2	Ogdensburg.....	61	-10	27.4	0.99	2.5	Berlin.....	70	-7	32.6	0.30	2.5
Fort Stanton.....	66	21	44.7	.....	.....	Okeana.....	80	-4	32.3	3.76	5.0	Bottineau.....	62	-11	30.2	1.05	1.0
Fort Union.....	72	18	43.6	.....	1.0	Oswegatchie.....	80	-4	32.3	3.40	.....	Cando.....	59	-10	29.4	0.66	5.0
Fort Wingate.....	67	22	42.2	2.85	18.7	Otto.....	77	-10	30.3	3.40	3.0	Churchs Ferry.....	64	-8	31.8	1.05	0.5
Fruitland.....	74	25	46.0	0.64	.....	Oxford.....	74	13	38.6	3.60	1.8	Coalharbor.....	68	-3	33.7	0.15	1.0
Gage.....	75	29	50.0	2.95	.....	Oyster Bay.....	80	-10	30.4	4.53	1.5	Cooperstown.....	63	-11	30.8	1.05	.....
Hillsboro.....	68	18	44.4	2.13	1.5	Palermo.....	68	-2	28.8	1.22	9.2	Dickinson.....	70	0	36.8	0.15	0.7
Las Vegas.....	83	30	52.3	3.24	1.1	Perry City.....	88	-4	36.0	2.37	6.5	Donnybrook.....	65	-7	33.9	T.	1.0
Lordsburg.....	79	25	48.0	1.00	.....	Plattsburg.....	69	-14	26.8	2.73	6.5	Dunseith.....	61	-10	29.6	1.19	6.9
Los Lunas.....	69	12	41.5	3.47	18.6	Port Jervis.....	80	-1	31.0	3.69	2.5	Edgeley.....	68	-1	33.8	0.79	.....
Luna.....	80	26	53.0	2.03	.....	Potsdam.....	79	6	32.2	2.45	8.0	Ellendale.....	69	-1	36.6	0.92	8.0
Mesilla Park.....	75	19	43.7	1.46	3.0	Richmondville.....	82	3	35.8	1.33	2.2	Fargo.....	68	-11	31.2	0.51	.....
Mineral Hill.....	79	29	51.8	2.60	0.5	Ridgeway.....	84	3	33.4	1.50	7.0	Forman.....	71	-3	34.5	0.88	4.0
Mountainair.....	71	23	42.6	2.45	8.5	Romulus.....	76	-14	26.4	3.42	1.0	Fort Berthold.....	69	-2	36.5	0.00	.....
Portales.....	65	18	41.6	2.62	.....	Salisbury Mills.....	72	-8	36.8	1.53	3.0	Fort Yates.....	72	-5	39.2	0.87	1.2
Raton.....	79	29	51.8	2.60	0.5	Saranac.....	69	14	37.0	2.57	1.0	Fullerton.....	69	-5	34.8	0.82	2.2
Redrock.....	71	23	42.6	2.45	8.5	Scarsdale.....	82	2	32.3	3.47	0.6	Glenullin.....	69	-1	36.4	0.38	0.6
Rodiada.....	65	18	41.6	2.62	.....	Setauket.....	80	-4	32.3	1.31	9.6	Grafton.....	63	-17	26.1	0.73	6.8
Rosa.....																	

TABLE II.—Climatological record of cooperative observers—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.		Stations.	Temperature. (Fahrenheit.)			Precipitation.		Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.		Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.		Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
North Dakota—Cont'd.						Ohio—Cont'd.						Oregon—Cont'd.					
Oakdale	69	-3	35.6	0.30	3.0	South Lorain	83	-1	39.2	1.32	4.7	McMinnville	77	28	50.6	6.52	
Park River	69	-20	29.3	1.36	0.3	Springfield	84	17	49.4	3.99	1.3	Marshfield	86	31	52.6	10.17	
Pembina	62	-22	25.2	2.02	4.7	Thurman	79	13	41.0	1.46	1.5	Meacham	74	31	49.6	4.30	16.0
Powder	69	-7	33.0	0.59	0.5	Tiffin	79	9	42.6	1.13	1.4	Monroe	82	32	51.2	6.32	
Rolla	62	-12	29.2	2.38	5.1	Upper Sandusky	79	20	43.0	0.89	1.0	Mount Angel	79	30	51.2	7.50	
Rugby	63	-7	31.4	0.75	4.5	Urbana	81	10	39.6	0.90	2.1	Nehalem	77	30	46.6	12.48	
Sentinell Butte	67	4	39.3	0.71		Vickery	82	7	38.7	3.54	2.6	Newport	77	30	46.6	7.50	2.0
Steele	67	-4	34.2	2.28	1.3	Warren	81	9	39.2	1.46	2.8	Ontario	65	12	43.1	1.58	
University	64	-15	31.9	2.35	2.5	Waucon	83	20	47.0	4.07	T.	Paisley	70	15	43.9	2.27	T.
Wahpeton	68	-1	37.0	0.25	0.7	Waverly	78	22	45.8	2.97	1.5	Pendleton	70	15	43.9	2.20	3.5
Walhalla	62	-20	28.7	1.81	0.5	Waynesville	81	9	40.4	1.43		Pine	76	35	51.4	10.29	
Washburn	69	-1	36.6	0.10	1.0	Wellington	82	21	47.4	3.91		Port Oxford	70	12	43.5	0.99	
Westhope	63	-8	32.5	0.38	1.0	Willoughby	79	10	41.2	2.61	3.0	Prineville	77	27	51.0	4.64	
Willow City	64	-12	30.7	0.30	3.0	Wilson						Salem	64	2	39.6	1.03	6.5
Wishek	65	-2	34.6	0.45	4.0	Wooster						Silverlake	65	15	43.1	2.53	20.0
Ohio.						Zanesville						Sparta	77	30	49.6	5.92	
Akron	80	8	40.0	2.79	1.0	Oklahoma.						Stafford	72	34	50.6	0.63	
Amesville	84	11	46.9	4.05	0.5	Alva	92	30	57.2	2.61	2.0	Toledo	85	29	51.3	10.25	
Atwater				2.54	3.0	Arapaho	90	33	55.4	1.86	T.	Umatilla	73	30	50.8	0.63	
Bangorville	78	11	41.4	2.55	2.5	Beaver	83	26	51.6	1.76		Vale	72	19	44.6	1.52	4.9
Bellefontaine	77	16	40.8	1.78	2.1	Binger	88	28	56.4	5.32		Wallawa	69	20	42.6	1.64	T.
Benton Ridge	80	11	42.1	1.26	1.5	Cleo	90	30	55.8			Wamie	71	24	46.1	0.80	0.3
Bladensburg	80	7	45.5			Cloud Chief	80	32	55.0	6.30		Warm Spring	70	19	47.3	0.92	5.0
Bowling Green	80	9	46.2	1.39	1.5	Eldorado	90	32	57.1	5.60		Weston	72	20	41.6	3.28	1.5
Bucyrus	78	12	41.4	0.22	T.	Elk City	87	32	52.8	3.91		Williams	74	30	48.8	4.32	
Cadiz	81	11	43.2	3.50	2.1	Enid	84	32	54.6	2.47		Pennsylvania.					
Cambridge	82	12	44.2	3.49		Erick	90	30	55.6	2.95		Aleppo	81	9	44.4	4.40	1.0
Camp Dennison	82	24	47.5	2.98		Fort Reno	89	33	54.8	6.52		Altoona	82	8	39.1	3.84	
Canal Dover	79	11	41.2	3.22	0.5	Fort Sill	85	31	56.8	3.43	0.5	Beaver Dam	80	9	41.0	4.25	4.0
Canton	78	12	40.4	3.22	3.9	Gage	86	27	51.0	3.04		Bellefonte				4.36	
Cardington	79	8	41.0	1.89	2.0	Grand				2.62	T.	Brookville				3.59	
Chillicothe	81	16	45.6	3.83	T.	Guthrie	83	36	56.0	5.88	1.0	Brownsville	85	15	44.6	4.07	0.4
Circleville	82	20	45.3	3.41	T.	Harrington	88	29	53.6	3.68		Cassandra	78	2	38.5	3.97	4.0
Clarington	85	13	46.0	4.66	0.1	Hennessy	86	34	56.6	4.35		Centerhall	82	0	38.1	2.52	6.1
Clarksburg	79	23	47.2	2.05	T.	Hobart	88	33	56.5	2.76		Clarion				4.60	3.2
Cleveland a	79	10	38.9	2.21	3.2	Jefferson	85	32	54.2	3.18	2.0	Claysville	84	10	44.6	3.02	2.5
Cleveland b	80	10	38.5	1.34	1.3	Jenkins	91	30	54.9	3.19		Clearfield				4.82	6.0
Coalton	83	16	47.4	3.66	T.	Kenton	75	26	48.6	1.56	T.	Coatsville	82	13	40.7	3.54	5.4
Colebrook	76	0	36.4	2.00	T.	Kingfisher	85	34	56.6	3.56		Confluence				4.98	2.0
Dayton	80	22	45.8	2.05	1.2	Luther	83	31	57.5			Coudersport	79	-13	32.5		
Delaware	81	10	41.3	1.18	2.3	McComb	89	29	57.0	4.24		Davis Island Dam				3.00	
Delaware	79	13	42.5	2.30	1.8	Meeker	82	30	56.0	4.90		Derry	83	9	43.4	4.26	1.0
Demos	81	13	43.9	3.57	T.	New Kirk	82	32	55.0	4.30		Doylestown				4.62	
Findlay	82	12	40.9	1.44	1.5	Norman	84	31	56.4	5.90		Dushore	80	-9	33.6	3.51	8.2
Frankfort	82	20	47.2	2.38	T.	Perry	86	34	55.5	3.48		East Bloomsburg				5.00	3.0
Fremont	82	14	41.2	1.41	1.6	Shawnee	83	36	57.9	5.18		East Mauch Chunk	86	5	38.0	4.43	4.5
Garrettsville	81	-5	38.2	2.72	2.4	Stillwater	83	30	54.2	5.42		Easton	76	9	38.8	3.89	4.0
Granville	81	15	43.4	2.26	0.1	Taloga				2.43		Ellwood Junction				3.66	T.
Gratiot	79	14	43.4	2.89	0.5	Temple	88	31	59.0	3.33		Emporium	80	-4	36.6	4.47	7.5
Green	82	23	49.0	4.75		Watonga	88	30	54.3	2.28		Ephrata	81	6	39.7	3.98	5.0
Greenfield	79	24	46.8	3.58	T.	Waukomis	87	34	56.4	3.15		Everett	81	18	40.2	4.26	0.8
Greenhill	83	2	38.8	2.71	2.0	Weatherford	87	32	54.2	2.86		Forks of Neshaminy				3.79	
Greenville	79	22	44.4	2.06	2.0	Whiteagle	84	34	55.2	3.59	1.0	Franklin	82	-4	37.9	2.99	1.0
Hedges	80	7	41.4	2.01	4.0	Woodward				1.20		Freeport				2.52	
Hillhouse	82	-4	36.0	1.88	1.0	Oregon.						Gettysburg	82	8	41.7	3.51	0.4
Hiram	79	5	38.9	2.46	2.0	Alpha	81	34	51.4	10.86		Girardville				6.57	9.5
Hudson	82	0	38.4	3.84		Antelope	67	25	46.2			Gordon	84	-6	36.9	5.71	8.0
Ironton	85	23	50.4	5.14		Arlington	73	32	50.3	0.98	6.2	Grampian	81	-5	36.2	3.30	1.0
Jacksonburg	81	23	45.8	3.46		Ashland	76	27	49.2	2.28		Greensboro				5.10	1.0
Kenton	74	11	43.0	1.72	2.4	Astoria	76	33	50.8	10.89		Greenville	81	1	38.4	2.93	1.5
Killbuck	80	11	41.5	3.50	1.9	Aurora (near)	79	28	50.1	5.21		Hamburg	78	12	39.1	4.41	4.5
Lancaster	79	18	44.6	3.57	0.5	Bay City	80	29	50.8	11.36	3.0	Hanover	83	14	42.6	3.80	1.0
Lima	79	12	42.0	2.06	6.0	Bend	72	10	41.1	2.39	7.0	Herr's Island Dam				3.15	
Manana	77	19	44.2	2.44	0.4	Beulah	65	14	39.8	0.58		Huntingdon	84	10	41.2	4.01	3.0
McConnelsville	83	14	44.9	3.98	0.5	Blackbutte	68	27	46.8	8.15		Indiana	83	5	41.2	3.72	2.8
Mansfield				2.14	2.3	Blalock	74	33	52.2	0.99	T.	Irwin	86	9	44.2	4.36	0.5
Marietta	82	18	47.2	4.24	0.1	Bonita	65	30	45.9	9.13	15.0	Johnstown				5.06	0.1
Marion	80	8	42.6	0.64	1.1	Bullrun				7.27		Kennett Square	78	11	40.8	4.15	4.0
Medina	82	-1	39.2	2.67	3.0	Burns	67	7	40.2	1.89		Lansdale				3.08	
Millfordton	80	10	41.0	2.63	1.5	Butter Creek				0.88		Lawrenceville	84	-12	33.3		5.0
Milligan	81	13	43.6	4.12	1.0	Cascade Locks	72	35	50.2	8.97		Lebanon	85	10	40.6	4.60	4.0
Millport	80	4	39.9	1.38	4.0	Coquille				8.35		Leroy	82	0	34.6	3.10	5.6
Montpelier	78	10	38.9	1.60	1.5	Corvallis	77	31	49.8	7.05	0.2	Lewisburg	86	6	39.6	5.00	4.0
Napoleon	81	10	41.7	1.21	0.5	Dayville	76	26	47.6	1.39	0.2	Lockhaven	85	3	40.0	3.34	7.0
Nelle	79	13	41.8	2.76	1.0	Doraville	73	28	48.2	5.86		Lock No. 4				4.57	0.5
New Alexandria	82	9	43.2	3.55		Drain	81	33	51.4	6.66		Lycippus	82	8	43.6	4.28	2.5
New Berlin	80	5	40.2	3.27	1.0	Ella				1.11		Marion	79	11	41.0	3.14	T.
New Bremen	79	19	43.0	1.61	2.5	Eugene	72	32	50.2	5.46		Mifflin				3.60	3.5
New Richmond	79	24	45.6	3.04		Fairview	84	32	52.0	10.24	T.	Mifflintown	83	9	40.4	4.26	5.0
New Waterford	83	5	39.8	3.25	3.0	Falls City	74	29	47.8	13.53		Millford	80	-2	34.4	3.87	1.8
North Lewisburg	80	16	42.8	3.25	1.0	Forestgrove				6.74		Montrose	79	2	33.9	3.28	
North Royalton	80	6	39.6	2.20	1.5	Gardiner	82	32	49.8	1.15		New Germantown	82	8	41.2	3.92	2.0
Northwalk	81	10	39.9	1.92	4.0	Glendale	80	31	49.1	7.20	T.	Oil City				3.49	1.2
Norwalk	81	5	39.2	1.92	1.6	Glenora	77	30	48.9	13.18	0.5	Ottsville				3.80	
Ohio State University	79	17	42.8														

TABLE II.—Climatological record of cooperative observers—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.		Stations.	Temperature. (Fahrenheit.)			Precipitation.		Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.		Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.		Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
<i>Pennsylvania—Cont'd.</i>						<i>South Dakota—Cont'd.</i>						<i>Texas—Cont'd.</i>					
Shawmont	81	2	40.0	3.54	2.0	Herreid	75	2	38.7	0.25	T.	Athens	90	37	64.0	3.62	Ins.
Skidmore	81	2	40.0	3.61	2.0	Highmore	72	4	38.5	0.60	1.0	Austin	85	44	64.6	6.68	
Smiths Corners	80	18	32.2	3.65	...	Holch City	77	9	39.4	0.31	3.0	Ballinger	85	36	59.6	4.54	
Somerset	79	6	39.0	3.90	2.9	Howard	78	8	39.1	0.44	4.0	Beoville	86	43	65.9	5.51	
South Eaton	82	3	36.4	4.45	3.0	Howell	75	5	37.8	0.44	3.1	Higspring	86	34	58.6	2.89	
Springmount	79	10	38.3	3.92	7.0	Ipswich	73	3	36.8	0.59	3.5	Blanco	84	35	52.2	3.71	
State College	82	9	35.1	3.20	5.5	Kidder	70	2	35.8	0.77	2.0	Boerne	83	38	62.2	3.30	
Towanda	81	6	34.7	4.04	5.5	Kimball	74	8	40.0	0.46	2.0	Bonham	82	36	55.4	6.71	
Warren	75	7	33.7	4.23	8.8	Leola	69	3	36.0	0.28	1.5	Booth	85	36	60.2	9.42	
West Chester	80	11	41.1	4.66	0.5	Leslie	76	13	42.4	0.20	0.5	Bowie	82	46	65.2	3.89	
West Newton	83	3	38.6	4.34	6.0	Marion	80	10	39.8	2.11	8.0	Brazoria	83	45	64.4	7.48	
Williamsbarre	81	4	39.6	3.61	6.0	Mellette	73	3	37.1	0.10	1.0	Brenham	78	48	61.8	3.01	
Williamsport	81	4	39.6	3.61	6.0	Menno	81	12	40.8	2.67	5.3	Brighton	85	35	60.4	4.10	
<i>Rhode Island.</i>						Milbank	74	0	34.8	0.52	4.0	Brownwood	80	28	51.2	2.43	0.5
Bristol	61	14	36.4	2.67	1.0	Mitchell	72	10	40.0	0.50	3.0	Channing	87	33	57.0	4.90	
Kingston	68	8	34.7	2.67	T.	Oelrichs	73	8	40.0	0.30	T.	Clarksville	84	38	60.4	6.36	
Narragansett	67	11	34.7	2.67	T.	On-the-Trees Camp	75	15	42.0	0.81	3.0	Claude	81	28	52.0	1.99	
Pawtucket	68	14	43.6	2.16	1.5	Pine Ridge	75	10	40.8	0.10	1.0	Claytonville	85	35	58.2	4.42	
Providence	68	14	43.6	2.16	1.5	Plankinton	80	5	38.3	1.40	2.0	Coleman	83	37	61.3	5.12	
<i>South Carolina.</i>						Ramsey	75	6	36.6	0.15	1.5	College Station	87	39	64.8	3.27	
Aiken	82	35	58.5	3.10		Redfield	80	8	40.2	2.43	3.6	Colorado	89	34	60.0	5.05	
Allendale	78	39	54.4	3.00		Sioux Falls	70	3	35.2	0.53	3.0	Columbia	81	46	63.7	6.13	
Anderson	77	30	55.8	1.35		Sisseton Agency	75	6	39.0	0.35	3.0	Columbus	86	37	60.4	3.65	
Barksdale	81	34	57.6	2.04		Stephan	84	12	42.2	6.13	3.8	Comanche	87	39	60.4	4.31	
Batesburg	80	37	60.0	3.58		Tyndall	83	12	42.3	1.97	4.0	Corsicana	84	41	63.0	5.55	
Beaufort	84	35	59.9	1.49		Vermillion	70	1	35.4	0.59	4.0	Crockett	87	47	66.4	4.53	
Bennettsville	84	37	59.6	2.50		Watertown	82	5	38.0	0.79	3.1	Cuero	85	35	59.6	4.44	
Blackville	88	33	59.8	3.22		Westworth	82	5	38.0	0.56	3.5	Danewang	83	47	65.4	5.54	
Bowman	88	33	59.8	3.22		Wolsey	82	5	38.0	0.56	3.5	Decatur	86	35	60.4	3.45	
Calhoun Falls	81	32	56.8	3.23		<i>Tennessee.</i>						Dialville	85	43	64.0	2.98	
Camden	81	36	58.6	2.03		Andersonville	75	30	55.7	2.35		Duval	88	39	63.8	1.02	
Cheraw	81	36	58.6	2.03		Ashwood	80	32	55.4	5.16		Eagle Pass	90	48	69.4	1.73	
Clarks Hill	72	30	52.8	1.22		Benton	83	27	55.4	2.69		Fort Brown	84	40	65.0	4.78	
Clemson College	83	34	58.3	2.75		Bluff City	79	32	54.6	5.56		Fort Clark	78	26	53.4	2.59	1.0
Conway	84	31	58.6	3.34		Bolivar	80	32	54.8	5.43		Fort Davis	89	43	67.4	1.04	
Dillon	79	37	57.5	1.62		Byrdstown	83	25	55.2	4.56		Fort McIntosh	90	45	71.4	2.76	
Due West	81	37	57.5	1.62		Carthage	80	32	54.8	5.43		Fort Ringgold	88	32	57.2	3.91	
Edisto	81	37	57.5	1.62		Cattlettsburg	84	32	55.0	3.25		Fort Stockton	82	37	61.8	3.63	
Effingham	88	31	58.0	2.18		Cedar Hill	82	30	54.5	3.28		Fredericksburg	83	32	59.1	4.11	
Enoree	83	28	56.4	1.06		Celina	78	34	55.6	3.72		Gainesville	84	30	63.4	2.15	
Florence	79	39	58.6	2.84		Clarksburg	80	28	54.8	5.27		Gatesville	88	39	63.8	5.39	
Gaffney	80	30	56.2	2.05		Clinton	83	29	54.2	4.12		Georgetown	87	23	61.6	2.95	
Georgetown	78	35	56.4	1.65		Covington	85	29	55.8	3.85		Gonzales	84	37	61.6	4.46	
Greenwood	82	30	55.2	1.93		Dandridge	80	33	54.8	3.17		Graham	86	38	61.0	4.07	
Heath Springs	83	36	60.8	2.30		Decatur	81	31	52.7	2.30		Grapevine	81	32	53.7	3.80	
Kingstree	80	31	56.2	1.46		Dickson	77	20	50.0	5.44		Greenville	83	47	65.8	4.03	
Liberty	81	34	58.5	1.29		Dover	80	31	54.5	4.40		Hale Center	85	35	59.0	3.19	
Little Mountain	81	31	56.2	1.49		Dyersburg	81	31	55.0	5.14		Hallettsville	85	35	62.1	4.95	
Newberry	82	35	58.6	1.45		Elizabethton	80	30	54.6	2.82		Haskell	89	41	68.4	3.26	
Pelzer	80	38	58.1	3.85		Erasmus	81	30	54.6	2.82		Hearne	80	30	63.4	2.15	
St. George	83	31	57.7	1.82		Florence	80	30	54.6	2.82		Hebronville	87	36	58.1	3.20	
St. Matthews	80	38	58.1	3.85		Franklin	81	31	55.0	5.14		Hempstead	80	30	61.3	2.49	2.5
St. Stephens	83	31	57.7	1.82		Greenville	80	30	54.6	2.82		Herrington	84	38	62.5	4.26	
Saluda	80	29	56.4	1.03		Halls Hill	80	29	54.0	5.90		Hewitt	85	42	65.6	3.31	
Santuck	84	32	57.2	2.59		Harriman	82	27	54.3	5.37		Hillsboro	89	47	66.2	9.85	
Severn	80	35	57.5	2.12		Hohenwald	83	29	56.4	4.42		Hondo	88	42	64.6	10.58	
Smiths Mills	80	31	57.6	1.01		Iron City	76	31	53.0	3.17		Houston	83	39	61.6	7.49	
Society Hill	83	37	60.1	2.30		Isabella	81	33	57.9	4.65		Huntsville	81	40	62.4	6.68	
Spartanburg	83	35	58.7	3.19		Jackson	84	29	55.4	3.02		Jefferson	84	40	62.4	3.06	
Statesburg	80	38	58.0	1.29		Johnsonville	82	27	52.3	1.02		Jewett	84	40	63.5	4.40	
Summerville	84	30	59.8	2.42		Jonesboro	82	32	55.6	3.33		Junction	81	40	62.4	3.06	
Trenton	84	30	59.8	2.42		Kenton	82	32	55.6	3.33		Kaufman	81	32	62.6	2.01	3.0
Trial	80	34	56.6	1.82		Kingston	82	28	55.2	4.85		Kent	82	41	62.8	3.75	
Walhalla	93	34	62.0	2.96		Lafayette	83	28	55.2	2.87		Kerrville	85	32	60.4	3.45	
Walterboro	80	34	58.4	1.10		Leadville	83	31	56.2	5.18		Knickerbocker	86	36	60.8	2.80	
Winthrop College	78	32	56.9	1.27		Lewisburg	81	33	56.8	4.19	T.	Kopperl	80	34	59.9	4.50	
Yemassee	84	33	60.1	3.76		Liberty	83	28	55.3	6.31		Lampasas	86	36	60.8	2.80	
Yorkville	82	35	57.9	1.18		Loudon	81	33	56.8	4.19		Lapara	88	39	59.0	2.42	
<i>South Dakota.</i>						Lynnville	81	33	56.8	4.19		Laureles Ranch	90	28	54.2	0.90	2.0
Aberdeen	76	4	38.0	0.53	7.0	McGee	83	29	55.7	4.46		Liberty	91	28	54.2	0.90	
Academy	75	12	41.6	1.48	5.0	McMinnville	83	32	56.4	3.48		Llano	88	39	59.0	2.35	
Alexandria	81	12	39.6	1.66	4.0	Maryville	79	33	54.9	3.06		Lone Star Ranch	80	34	59.9	4.50	
Armour	79	14	42.2	0.96	0.5	Newport	82	31	55.6	4.60		Longlake	82	45	64.6	3.95	
Ashcroft	72	8	38.2	0.75	0.5	Palmetto	85	28	56.1	5.10		Longview	85	35	62.0	5.22	
Bowdle	70	2	37.2	0.60	2.5	Pope	83	26	53.9	3.74		Luling	85	42	62.2	4.07	
Brookings	73	3	36.4	0.68	3.0	Rogersville	79	23	51.8	4.68		McKinney	84	34	57.6	4.46	
Canton	80	9	40.2	2.11	T.	Rotherwood	83	33	58.5	4.89		Marlin	85	42	62.2	4.07	
Cavite	80 ^b	12 ^b	39.4 ^b	0.55	0.5	Rugby	77	34	54.6	3.84		Menardville	84	34	57.6	4.46	
Centerville	78	13	41.5	1.94	4.5	Savannah	77	34	54.6	3.84		Mexia	83	41	61.7	5.22	T.
Chamberlain	75	7	40.4	T.	5.0	Sewanee	82	29	54.8	4.67		Mount Blanco	84	42	63.2	5.62	
Cheyenne	74	1	37.4	1.35	6.5	Silver Lake	77	27	48.2	2.54		Nacogdoches	83	45	64.8	4.44	
Clear Lake	68	2	34.4	0.50	4.2	Sparta	80	25	52.4	3.16		New Braunfels	84	40	62.4	3.70	
Doland	76	3	36.6	0.60	5.0	Springdale	82	29	54.8	4.67		Orange	80	34	59.9	4.50	
Elkpoint	84	11	41.6	1.30	5.0	Springville	82	29									

TABLE II.—Climatological record of cooperative observers—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.		Stations.	Temperature. (Fahrenheit.)			Precipitation.		Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.		Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.		Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
<i>Texas—Cont'd.</i>						<i>Vermont—Cont'd.</i>						<i>Washington—Cont'd.</i>					
San Saba	85	35	62.1	Ins.	Ins.	Jacksonville	62	—10	25.2	1.35	13.0	Pullman	68	28	43.5	2.60	3.0
Santa Gertrude	79	42	60.4	4.49		Manchester	70	—4	29.0	1.93	3.8	Rattlesnake	62	22	42.1	1.30	0.8
Sherman	84	28	58.9	3.61		Norwich	64	—11	26.8	2.46	11.0	Republic	69	23	40.7	1.51	1.0
Sonora	85	46	59.8	10.71		St. Johnsbury	69	—17	27.0	2.10	0.5	Ritzville	66	23	42.6	1.81	0.2
Sugarland	82	40	62.1	5.45		Wells	66	—4	26.9	2.62	11.0	Rosalia	66	23	42.6	2.11	3.2
Sulphur Springs	84	39	61.8	4.28		Westfield	66	—14	25.2	2.18	13.0	Sedro	66	31	48.3	3.32	
Temple	78	25	46.8	0.83	0.5	Woodstock	66	—14	25.2	2.18	13.0	Silvana	66	30	46.8	2.53	
Texline	98	40	68.3	2.63		Ashland	80	20	47.8	1.73		Snohomish	66	33	48.6	4.04	
Tilden	87	42	63.4	7.16		Barboursville	79	20	48.5	2.19	T.	Southbend	72	31	48.6	5.12	
Trinity	83	28	52.1	1.65		Bigstone Gap	77	25	52.0	3.60		South Ellensburg	79	38	54.9	10.28	
Tulia	87	39	61.4	5.47		Blacksburg	76	22	46.8	2.53		Sprague	66	26	43.1	0.35	2.0
Tyler	84	46	65.8	5.04		Buchanan	79	18	44.2	1.93		Sunnyside	74	26	47.0	0.68	T.
Uvalde	88	42	63.9	8.38		Burkes Garden	80	20	51.1	3.90		Touche	74	26	47.0	0.68	0.2
Victoria	85	34	60.0	5.62		Callville	78	28	47.8	2.14	T.	Trinidad	61	25	45.8	1.10	
Waco	84	35	59.8	3.79		Cape Henry	83	21	48.6	1.83		Twisp	71	30	47.6	11.88	0.5
Weatherford	84	35	59.8	4.71		Charlottesville	80	19	48.7	1.27		Union	80	30	51.2	4.05	T.
Wichita Falls	73	26	47.9	1.02		Clarksville	79	20	45.9	2.35	3.0	Vancouver	65	33	48.6	3.62	
Alpine	65	14	40.9	1.34	1.0	Columbia	80	19	48.7	1.27		Vashon	72	31	49.4	0.30	
Aneth	66	19	42.4	1.74	6.0	Dale Enterprise	79	20	45.9	2.35		Wahluke	67	25	39.8	1.57	8.2
Beaver	66	19	42.4	1.74	6.0	Danville	80	15	49.2	3.51		Waterville	66	27	44.2	1.70	3.0
Blackrock	66	19	42.4	1.74	6.0	Dinwiddie	75	32	52.4	3.19		Wenatchee (near)	69	24	43.0	1.65	4.3
Castledale	72	18	38.2	0.93		Elm	77	22	48.3	1.68		Wilbur	77	29	50.4	1.99	
Castle Rock	67	23	45.4	0.17	5.5	Farmville	82	18	47.0	1.61	T.	Zindel	77	29	50.4	1.99	
Cisco	69	18	44.0	2.02	6.0	Fredericksburg	74	25	48.0	1.53		Bancroft	85	22	50.7	5.95	
Clear Creek	66	13	38.2	0.70		Grahams Forge	76	25	49.0	3.04		Bayard	77	9	41.1	4.64	
Corinne	69	17	44.2	1.06	3.0	Hampton	73	19	44.5	3.55		Beas Run	84	15	46.8	5.37	
Coyote	66	13	38.2	0.70		Howardsville	78	23	48.4	2.07	0.2	Bluefield	77	25	49.2	1.48	
Deseret	64	16	36.4	0.62		Ivanhoe	85	8	43.6	2.60	4.0	Buckhannon	80	15	45.6	5.42	0.2
Emery	64	25	42.4	1.20		Lexington	78	23	48.4	2.07	0.2	Burlington	82	7	42.4	3.90	7.0
Escalante	77	27	52.6			Lincoln	85	8	43.6	2.60	4.0	Cairo	84	12	46.3	2.80	
Experiment Farm	69	13	44.4	4.18	15.7	Mendota	78	27	49.5	3.06		Central	84	12	45.5	3.89	1.0
Farmington	73	19	45.4	2.66		Newport News	78	27	51.3	4.15		Charleston	83	26	52.0	4.81	
Fillmore	61	19	42.1	1.55		Petersburg	78	27	51.3	4.15		Creston	84	18	46.2	3.51	
Fort Duchesne	66	18	42.2	1.71		Quantico	86	19	46.7	2.28		Cuba	83	17	47.5	4.21	
Frisco	70	18	43.4	0.30		Radford	80	19	46.7	2.28		Elkhorn	77	28	51.1	3.22	
Garrison	72	22	46.9	0.48		Randolph	81	19	48.4	3.70		Fairmont	85	19	48.1	5.06	0.8
Giles	61	9	41.2	2.72	11.0	Riverton	82	24	49.0	1.91	1.0	Glenville	84	13	46.4	5.78	0.8
Government Creek	83	22	42.0	2.27	2.5	Ronoke	78	19	50.2	2.56		Grafton	78	14	46.9	1.88	
Grayson	75	20	48.4	0.65		Roxymount	82	24	49.0	1.91		Green Sulphur Springs	84	13	46.4	5.78	
Green River	61	12	39.0	1.69		Saxe	78	19	50.2	2.56		Harpers Ferry	85	12	46.4	5.13	2.4
Heber	64	12	39.7	1.67	2.0	Shenandoah	81	19	48.4	3.70	T.	Hinton	83	24	48.2	4.86	
Hefner	79	32	52.7	1.31		Speers Ferry	80	17	46.6	2.93		Huntington	73	21	42.5	1.20	
Hite	64	12	39.7	1.67	2.0	Spotsville	79	24	47.6	2.39	T.	Leonard	76	23	46.6	3.06	
Huntsville	64	0	37.8	1.35	4.0	Stannardsville	83	13	46.4	3.32		Lewisburg	85	30	54.5	4.73	
Ibapah	68	14	41.1	2.10		Staunton	83	13	46.4	3.32		Logan	82	11	43.2	6.34	
Indianola	60	16	38.0	1.94	1.5	Stephens City	83	16	48.9	1.96	T.	Lost Creek	81	13	44.9	4.83	1.2
Kanab	58	18	38.0	1.94		Warsaw	81	20	47.0	2.65	0.2	Mannington	74	12	41.3	3.27	T.
Kelton	59	19	41.5	2.10	2.8	Wilkeson	78	19	48.6	3.58		Marlinton	83	17	42.6	2.95	
La Sal	62	17	42.2	2.22		Williamsburg	83	12	46.0	2.53	2.5	Martinsburg	84	13	47.0	1.69	2.4
Levan	63	18	41.2	1.90		Woodstock	82	27	48.9	11.93		Moorefield	85	12	46.4	5.13	
Logan	64	17	42.2	2.22		Aberdeen	65	32	47.8	1.27	3.5	Morgantown	88	14	46.4	3.71	
Manti	68	19	44.6	3.33	17.0	Anacortes	64	33	47.0	2.45		Moundsville	83	10	42.3	3.15	1.5
Mariaville	72	24	48.6	1.51		Ashford	61	30	47.0	4.83		New Cumberland	86	15	47.6	4.77	1.0
Marysville	63	11	39.4	2.45	7.0	Bellingham	69	30	49.1	6.19		New Martinsville	85	25	55.1	3.85	
Meadowville	64	18	44.0	1.62	2.0	Blaine	71	30	48.2	9.75		Nuttallburg	83	4	43.4	4.87	3.0
Millville	63	17	41.5	1.76		Bremerton	63	20	40.5	2.37	4.5	Parsons	85	12	46.4	4.98	0.7
Mineraville	63	17	41.5	1.76		Brinnon	75	26	49.8	5.69		Phillippi	74	18	44.0	4.75	T.
Moab	64	16	44.0	3.36	8.4	Cedonia	64	22	41.8	2.51	5.0	Pickens	85	22	49.0	4.81	
Morgan	64	16	44.0	3.36	8.4	Centralia	73	27	47.4	4.00		Point Pleasant	75	24	47.9	6.00	
Mount Nebo	64	16	44.0	3.36	8.4	Cheney	70	29	47.3	18.59	1.5	Princeton	84	13	47.0	1.69	3.5
Mount Pleasant	64	16	44.0	3.36	8.4	Clearbrook	72	23	42.4	1.04		Romney	85	12	46.4	5.13	2.5
Nephel	66	15	41.6	2.29	19.8	Clearwater	70	28	44.9	1.79		Roulesburg	84	20	47.6	4.56	
Ogden	66	15	41.6	2.29	19.8	Cle Elum	72	23	42.4	1.04		Ryan	84	12	45.2	3.29	T.
Panquitch	66	15	41.6	2.29	19.8	Colfax	70	28	44.9	1.79		Smithfield	81	20	53.9	5.59	
Parowan	66	15	41.6	2.29	19.8	Colville	72	25	43.0	1.76	0.2	Southside	80	—2	41.3	6.82	6.5
Payson	60	8	38.6	2.28		Conconully	66	24	41.4	1.87	1.0	Terra Alta	82	10	45.8	2.29	3.0
Pinto	57	0	36.8	2.10	19.5	Coupeville	68	31	49.4	1.75		Uppertract	81	23	48.0	5.17	
Plateau	67	18	44.0	2.22		Crescent	65	21	42.4	1.19		Valley Fork	79	12	42.0	2.46	2.0
Provo	60	2	37.7	3.07		Cusick	71	20	41.0	2.44		Wellsburg	85	14	46.3	5.71	1.2
Ranch	81	24	54.2	1.81		Danville	70	25	42.3	1.37	1.0	Weston	83	22	49.8	5.58	T.
Randolph	78	25	53.2	1.58		Dayton	74	30	46.6	2.41	1.5	Wheeling	85	27	51.2	3.47	
Rockville	72	27	44.7	0.41		East Sound	64	27	45.7	2.10		Williamson	85	27	51.2	3.47	
St. George	68	28	46.8	0.98		Ellensburg	72	27	44.7	0.41		Amherst	77	—3	32.4	2.32	4.0
Salina	68	28	46.8	0.98		Ephrata	68	28	46.8	0.98	3.0	Antigo	70	—8	30.6	0.90	T.
Salt Air	77	21	45.0	2.58	10.0	Grandmound	72	24	47.8	5.64		Appleton	67	1	32.6	1.96	0.9
Scipio	66	4	39.6	1.70		Granite Falls	84	24	49.4	0.63	0.2	Appleton Marsh	75	—8	33.0	1.67	1.0
Snowville	66	4	39.6	1.70		Hatton	79	30	50.1	10.00		Ashland	73	9	37.6	2.79	1.01
Soldier Summit	55	10	33.6	1.23	6.0	Ilwaco	78	27	50.0	0.45	0.3	Beloit	70	—1	31.5	0.18	0.8
Sunnyside	68	11	41.0	1.65	8.5	Kennebec	76	28	49.7	0.66	T.	Black River Falls	77	8	37.7	2.49	7.0
Thistle	66	16	43.6	3.21		Kiona	76	26	49.0	5.93		Brodhead	73	8	32.8	1.66	4.0
Tooele	64	15	39.2	0.63		Lacater	65	30	44.2	0.97	1.5	Burnett	67	—16	27.6	0.98	1.4
Torrey	66	20	41.0	1.25	1.2	Lakeside	77	30	46.3	3.46	2.7	Butternut	74	0	32.3	2.28	3.6
Tropic	70	14	41.5	0.95		Lester	68	23	45.0								

TABLE II.—Climatological record of cooperative observers. Late reports for February—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
<i>Wisconsin—Cont'd.</i>					
Hayward	68	-13	29.2	1.10	0.5
Koepenick	75	-20	28.4	1.80	3.0
Lancaster	74	3	37.0	1.46	10.0
Manitowoc	64	4	32.6	2.57	1.5
Mauston	77	-4	35.5	1.63	4.0
Meadow Valley	77	-6	31.9	1.31	1.8
Medford	70	-2	31.5	1.75	T.
Menasha				0.87	T.
Minocqua	69	-12	28.4	1.00	T.
Mount Horeb	75	-1	34.3	1.84	11.8
Neillsville	68	-6	33.0	1.96	
New London	73	-2	32.4	2.10	T.
New Richmond	66	-2	35.0	1.11	2.0
Oconto	70	-3	30.6	2.38	T.
Osceola	67	-16	33.3	0.73	0.5
Oshkosh	74	4	33.4	1.85	1.0
Pine River	75	-5	33.2	1.65	0.7
Portage	75	0	35.0	1.43	5.0
Port Washington	67	6	29.5	2.20	11.0
Prairie du Chien	77	7	41.3	1.19	9.4
Prentice	78	-16	32.2	0.28	0.4
Racine	74	8	37.2	1.96	
Sheboygan	70	5	34.3	1.86	3.0
Spooner	69	-13	31.4	0.94	
Stanley	68	-12	31.9	1.41	1.2
Stevens Point	77	-4	32.8	0.75	T.
Tomahawk				1.80	
Valley Junction	74	-4	34.9	1.29	0.5
Viroqua	71	-1	35.2	2.00	6.0
Watertown	75	2	34.0	3.12	15.0
Waukesha	74	4	34.0	2.50	6.4
Waupaca	72	-2	31.4	1.80	T.
Wausau	73	1	32.8	1.41	T.
Whitehall	72	-8	34.6	1.70	T.
<i>Wyoming.</i>					
Afton	50	-2	31.2	2.09	2.0
Alcova	62	17	39.0	0.42	T.
Basin	69	12	41.4	0.28	T.
Bedford	54	-2	30.5	1.31	4.8
Border	56	-8	31.2	0.77	
Buffalo	74	8	37.4	0.74	5.8
Cambria	66	10	38.6	2.32	18.5
Chugwater	66	15	39.7	0.56	2.0
Daniel	50	-8	27.6	1.30	13.0
Eatons Ranch	71	9	40.2	2.10	21.0
Embar	69	10	36.6	0.55	5.5
Evanson	55	7	34.6	1.72	8.5
Fayette	50	0	28.5	1.30	13.0
Fontenelle	52	13	32.6	T.	T.
Fort Laramie	71	16	41.2	0.49	0.6
Fort Washakie	65	13	38.7	1.20	10.0
Granite Canyon	62	8	35.2	0.68	6.0
Green River	60	8	37.8	1.71	
Griggs	72	11	39.6	0.62	5.8
Hatton				1.96	16.0
Hyattville	70	9	40.9	0.32	0.1
Kirtley	66	10	37.6	1.04	4.0
Laramie	57	4	34.6	0.64	5.1
Leo	55	1	35.2	0.34	3.0
Little Medicine	52	-1	30.8	0.51	5.8
Lusk	63	10	37.6	0.22	2.2
Marquette	69	-1	38.0	1.40	14.0
Meeteetse	68	2	36.6	0.70	7.0
Moore	63	11	38.0	0.60	5.8
Moorecroft	70	12	40.0	1.00	10.0
Phillips	67	13	41.5	0.56	T.
Pine Bluff	69	14	40.4	0.76	
Rock Springs	57	11	35.6		
Sheridan	73	11	41.0	2.10	11.0
South Pass City	56	-5	28.9	2.10	21.0
Thayne	53	-2	30.8	1.19	6.2
Thermopolis				1.15	4.5
Torrington	70	16	42.5	0.25	0.9
Wells	47	-6	26.2	1.93	18.5
Wilson	58	-3	32.2	2.00	8.5
Yellowstone Park (C. H.)	60	-4	26.6	1.62	27.5
Yellowstone Pk. (Foun'n)	61				
Yellowstone Pk. (Lake)	52	-11	24.4	1.97	18.2
Yellowstone Pk. (Norris)				3.35	33.5
Yellowstone Pk. (U. Ba'n)	61	-4	32.0	2.55	26.0
Yellowstone Pk. (Soda R.)	56	2	29.0	1.60	14.0
<i>Porto Rico.</i>					
Adjuntas	84	48	66.9	2.56	
Agua Buenas				6.93	
Aguirre	95	62	77.4	5.01	
Albionito	83	46	67.6	4.65	
Arecibo	89	52	69.8	2.80	
<i>Porto Rico—Cont'd.</i>					
Barros	81	50	68.2	4.35	
Bayamon	87	56	72.2	4.80	
Caguas	88	55	72.8	3.91	
Canovanas	89	65	76.4	5.38	
Coamo	88	58	74.2	2.59	
Corozal	89	57	75.8	3.25	
Fajardo	89	59	74.5	4.76	
Guanica	94	60	76.8	1.05	
Hacienda Colosa	87	58	73.7	5.82	
Hacienda Josefa				4.02	
Humacao	87	70	77.6	4.47	
Ingenio				3.02	
Isabela	87	63	75.2	3.96	
Juana Diaz	91	63	77.3	2.99	
La Carmelita	85	59	70.8	6.82	
La Ysolina	86	58	71.2	7.86	
Lares	87	55	70.8	8.46	
Las Marias	85	58	71.8	9.31	
Manati	94	59	74.3	3.77	
Maunabo	90	59	75.0	3.58	
Mayaguez	95	59	74.6	6.01	
Morovis	90	57	73.6	7.65	
Ponce				7.67	
Rio Blanco	88	60	75.0	4.98	
Rio Piedras				7.53	
San German	90	57	74.1	3.03	
San Lorenzo	90	53	73.2	6.57	
San Salvador	82	56	69.4	6.21	
Santa Isabel	88	59	74.4	2.54	
Vieques	88	66	77.4	1.98	
Yauco	85	60	73.8	3.09	
<i>New Brunswick.</i>					
St. John	50	0	27.1	1.12	4.34
<i>Late reports for February, 1905.</i>					
<i>Alaska.</i>					
Fairbanks				0.50	5.0
Fort Gibbon	38	-22	6.0	0.47	4.0
Fort Lisicum	40	8	24.2	5.73	40.1
Kenai	48	7	29.5	0.92	10.0
Ketchikan	34	-44	-2.2	0.10	0.5
Loring	48	9	32.2	13.19	9.5
Skagway	49	9	28.2	1.14	T.
Sunrise	45	9	29.8	1.93	4.1
Telkhill	42	-21	10.4	0.49	4.5
Wood Island	52	28	38.8	4.90	6.4
<i>Arizona.</i>					
Champion Camp	80	12	46.0	11.19	
<i>Arkansas.</i>					
Brinkley	76	1	31.2	1.90	8.5
Whitecliffs				3.55	
<i>California.</i>					
Yreka				0.58	T.
<i>Colorado.</i>					
Collbran	51	-30	25.8	2.05	20.0
<i>Georgia.</i>					
Canton				5.64	0.7
Resaca				7.78	1.2
<i>Illinois.</i>					
Beardstown				1.58	13.0
<i>Iowa.</i>					
College Springs	62	-30	14.9	1.58	13.8
Knoxville	69	-26	16.6	0.40	2.0
<i>Kansas.</i>					
Lakin	69	-20	21.0	T.	T.
Phillipsburg	71	-21	20.8	0.30	5.0
<i>Minnesota.</i>					
Two Harbors	46	-25	11.0	0.48	9.0
<i>Missouri.</i>					
Gorin				2.29	18.8
<i>New Hampshire.</i>					
Littleton	35	-14	9.8	1.25	13.0
<i>North Carolina.</i>					
Brevard	60	-5	32.8	3.24	3.9
<i>Ohio.</i>					
Cleveland a.	42	-11	20.5	1.86	10.6
<i>South Carolina.</i>					
Due West	62	10	37.2	6.44	
<i>Porto Rico.</i>					
Arecibo	86	52	69.2	2.85	
Isabela				2.20	
<i>Mexico.</i>					
Vera Cruz	79	61	70.4	0.35	

EXPLANATION OF SIGNS.

* Extremes of temperature from observed readings of dry thermometer.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

¹ Mean of 7 a. m. + 2 p. m. + 9 p. m. + 4.

² Mean of 8 a. m. + 8 p. m. + 2.

³ Mean of 7 a. m. + 7 p. m. + 2.

⁴ Mean of 6 a. m. + 6 p. m. + 2.

⁵ Mean of 7 a. m. + 2 p. m. + 2.

⁶ Mean of readings at various hours reduced to true daily mean by special tables.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An italic letter following the name of a station, as "Livingston a," "Livingston b," indicates that two or more observers, as the case may be, are reporting from the same station. A small roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record; for instance, "a" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks of whatever duration, in the precipitation record receive appropriate notice.

CORRECTIONS.

February, 1905, Connecticut, Falls Village, make total snowfall 9.0 instead of 7.8. New Mexico, Fairview, make total precipitation 1.10 instead of 0.38; San Marcial, make mean temperature 43.5 instead of 43.6.

TABLE III.—Resultant winds from observations at 8 a. m. and 8 p. m., daily, during the month of March, 1905.

Stations.	Component direction from—				Resultant.		Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.		N.	S.	E.	W.	Direction from—	Duration.
<i>New England.</i>													
Eastport, Me.	17	20	5	31	s. 83 w.	26	Moorhead, Minn.	23	18	21	14	n. 54 e.	9
Portland, Me.	13	29	5	26	s. 53 w.	26	Bismarck, N. Dak.	26	11	20	21	n. 4 w.	15
Concord, N. H. †	17	3	9	9	s. 6 n.	14	Devils Lake, N. Dak.	22	18	15	20	n. 51 w.	6
Northfield, Vt.	24	30	3	11	s. 53 w.	10	Williston, N. Dak.	22	18	20	19	n. 14 e.	4
Boston, Mass.	17	14	11	33	n. 82 w.	22	<i>Upper Mississippi Valley.</i>						
Nantucket, Mass.	19	19	14	26	n. 81 w.	12	Minneapolis, Minn. *	6	11	10	11	s. 11 w.	5
Block Island, R. I.	18	16	15	27	n. 81 w.	12	St. Paul, Minn.	19	24	18	15	s. 31 e.	6
Providence, R. I.	22	15	14	30	n. 66 w.	18	La Crosse, Wis. †	9	15	8	6	s. 18 e.	6
Hartford, Conn.	27	19	5	22	n. 65 w.	19	Madison, Wis. †	20	25	17	16	s. 11 e.	5
New Haven, Conn.	27	14	15	22	n. 28 w.	15	Charles City, Iowa	18	22	24	16	s. 63 e.	9
<i>Middle Atlantic States.</i>													
Albany, N. Y.	21	26	11	13	s. 22 w.	5	Davenport, Iowa	17	18	22	18	s. 76 e.	4
Binghamton, N. Y. †	10	9	16	8	n. 49 e.	11	Des Moines, Iowa	15	24	20	14	s. 34 e.	11
New York, N. Y.	20	13	20	26	n. 41 w.	9	Dubuque, Iowa	19	23	15	18	s. 37 w.	5
Harrisburg, Pa.	17	15	23	18	n. 68 e.	5	Keokuk, Iowa	21	24	20	12	s. 69 e.	8
Philadelphia, Pa.	26	18	19	14	n. 32 e.	9	Calro, Ill.	21	26	17	11	s. 63 e.	7
Scranton, Pa.	28	19	17	18	n. 6 w.	9	La Salle, Ill. †	11	9	13	8	s. 68 e.	5
Atlantic City, N. J.	22	19	16	22	n. 63 w.	7	Peoria, Ill.	12	13	11	3	s. 83 e.	8
Cape May, N. J.	23	21	21	14	n. 74 e.	7	Springfield, Ill.	22	24	17	14	s. 86 e.	1
Baltimore, Md.	20	18	21	15	n. 72 e.	6	Hannibal, Mo. †	10	16	9	8	s. 81 e.	4
Washington, D. C.	21	21	22	11	n. 72 e.	11	St. Louis, Mo.	14	22	26	13	s. 58 e.	16
Lynchburg, Va.	15	22	23	15	s. 49 e.	11	<i>Missouri Valley.</i>						
Mount Weather, Va.	16	18	19	24	s. 68 w.	5	Columbia, Mo. *	9	11	13	7	s. 72 e.	6
Norfolk, Va.	19	25	24	9	s. 68 e.	16	Kansas City, Mo.	17	24	25	13	s. 60 e.	14
Richmond, Va.	21	21	18	15	s. 68 e.	3	Springfield, Mo.	13	28	20	13	s. 23 e.	17
Wytheville, Va.	14	12	16	31	n. 82 w.	15	Topeka, Kans. *	9	13	12	5	s. 60 e.	8
<i>South Atlantic States.</i>													
Asheville, N. C.	15	26	27	13	s. 52 e.	18	Lincoln, Nebr.	19	25	17	17	s. 8 e.	8
Charlotte, N. C.	11	28	25	9	s. 43 e.	23	Omaha, Nebr.	19	27	15	15	s. 8 e.	20
Hatteras, N. C.	25	16	23	17	n. 34 e.	11	Valentine, Nebr.	28	10	14	23	n. 27 w.	3
Raleigh, N. C.	23	23	16	14	n. 72 e.	2	Sioux City, Iowa †	10	8	11	9	n. 45 e.	8
Wilmington, N. C.	23	20	22	13	n. 72 e.	10	Pierre, S. Dak.	19	11	21	24	n. 21 w.	8
Charleston, S. C.	17	18	28	12	s. 87 e.	16	Huron, S. Dak.	22	16	21	16	n. 40 e.	8
Columbia, S. C.	15	20	26	14	s. 67 e.	13	Yankton, S. Dak. †	7	7	10	12	w.	2
Augusta, Ga.	17	20	21	17	s. 53 e.	5	<i>Northern Slope.</i>						
Savannah, Ga.	17	17	26	14	n. 62 e.	12	Havre, Mont.	16	12	18	30	n. 72 w.	13
Jacksonville, Fla.	24	16	26	11	n. 62 e.	17	Miles City, Mont.	16	18	17	22	s. 68 w.	5
<i>Florida Peninsula.</i>													
Jupiter, Fla.	16	21	26	12	s. 70 e.	15	Helena, Mont.	16	15	4	40	n. 88 w.	36
Key West, Fla.	21	14	32	6	n. 75 e.	27	Kalispell, Mont.	19	22	7	26	s. 81 w.	19
Tampa, Fla.	23	9	27	19	n. 30 e.	16	Rapid City, S. Dak.	25	12	12	27	n. 49 w.	20
<i>Eastern Gulf States.</i>													
Atlanta, Ga.	17	13	30	16	n. 74 e.	15	Cheyenne, Wyo.	31	13	6	23	n. 43 w.	25
Macon, Ga. †	15	8	9	7	n. 16 e.	7	Lander, Wyo.	20	17	14	25	n. 75 w.	11
Pensacola, Fla. †	13	3	13	9	n. 22 e.	11	Yellowstone Park, Wyo.	14	29	5	29	s. 58 w.	28
Birmingham, Ala. †	8	9	14	8	s. 80 e.	6	North Platte, Nebr.	20	20	14	22	w.	8
Mobile, Ala.	20	28	12	11	s. 7 e.	8	<i>Middle Slope.</i>						
Montgomery, Ala.	20	19	19	16	n. 72 e.	3	Denver, Colo.	27	21	8	13	n. 40 w.	8
Meridian, Miss. †	10	8	11	6	n. 68 e.	5	Pueblo, Colo.	23	15	22	20	n. 14 e.	8
Vicksburg, Miss.	12	25	26	11	s. 49 e.	20	Concordia, Kans.	14	29	19	15	s. 15 e.	16
New Orleans, La.	17	28	21	9	s. 47 e.	16	Dodge, Kans.	19	21	26	12	s. 82 e.	14
<i>Western Gulf States.</i>													
Shreveport, La.	14	29	25	9	s. 47 e.	22	Wichita, Kans.	17	25	19	10	s. 48 e.	12
Fort Smith, Ark.	16	14	31	10	n. 85 e.	21	Oklahoma, Okla.	17	26	21	13	s. 42 e.	12
Little Rock, Ark.	16	25	19	14	s. 29 e.	10	<i>Southern Slope.</i>						
Corpus Christi, Tex.	11	26	34	4	s. 63 e.	34	Abilene, Tex.	15	29	22	12	s. 36 e.	17
Fort Worth, Tex.	15	25	22	16	s. 31 e.	12	Amarillo, Tex.	14	29	14	15	s. 4 w.	15
Galveston, Tex.	13	33	24	8	s. 39 e.	26	Roswell, N. Mex.	16	24	13	19	s. 37 w.	10
Palestine, Tex.	15	31	19	15	s. 14 e.	16	<i>Southern Plateau.</i>						
San Antonio, Tex.	11	24	37	8	s. 66 e.	32	El Paso, Tex.	17	7	14	36	n. 66 w.	24
Taylor, Tex. †	7	17	6	6	s.	10	Santa Fe, N. Mex.	25	15	19	19	n.	10
<i>Ohio Valley and Tennessee.</i>													
Chattanooga, Tenn.	17	22	15	19	s. 39 w.	6	Flagstaff, Ariz.	20	15	9	32	n. 78 w.	24
Knoxville, Tenn.	21	21	9	25	n. 85 e.	16	Phoenix, Ariz.	13	8	25	24	n. 11 e.	5
Memphis, Tenn.	15	29	19	15	s. 16 e.	15	Yuma, Ariz.	16	18	19	18	s. 27 e.	2
Nashville, Tenn.	23	21	14	17	n. 56 w.	4	Independence, Cal.	24	20	15	19	n. 45 w.	6
Lexington, Ky. †	9	13	11	6	s. 51 e.	6	<i>Middle Plateau.</i>						
Louisville, Ky.	23	24	16	11	s. 79 e.	5	Carson City, Nev.	11	29	9	25	s. 42 w.	24
Evansville, Ind. †	12	11	4	6	n. 63 w.	2	Winnemucca, Nev.	20	19	17	26	n. 84 w.	9
Indianapolis, Ind.	24	25	13	13	s.	1	Modena, Utah.	13	1	15	36	n. 60 w.	24
Cincinnati, Ohio.	22	19	25	16	n. 72 e.	10	Salt Lake City, Utah.	14	22	19	20	s. 7 w.	8
Columbus, Ohio.	19	25	18	15	s. 27 e.	7	Durango, Colo.	21	17	3	32	n. 82 w.	29
Pittsburg, Pa.	27	20	9	21	n. 60 w.	14	Grand Junction, Colo.	28	14	14	21	n. 27 w.	16
Parkersburg, W. Va.	20	21	9	24	s. 86 w.	15	<i>Northern Plateau.</i>						
Elkins, W. Va.	28	16	3	24	n. 60 w.	24	Baker City, Oreg.	15	30	24	14	s. 34 e.	18
<i>Lower Lake Region.</i>													
Buffalo, N. Y.	13	28	17	22	s. 18 w.	16	Boise, Idaho	15	21	22	18	s. 34 e.	7
Oswego, N. Y.	13	29	14	16	s. 7 w.	16	Lewiston, Idaho †	4	4	21	7	s. e.	14
Rochester, N. Y.	13	29	12	24	s. 37 w.	20	Pocahontas, Idaho.	4	35	26	14	s. 21 e.	33
Syracuse, N. Y.	18	17	13	26	n. 86 w.	13	Spokane, Wash.	10	28	21	15	s. 18 e.	19
Erie, Pa.	14	22	14	20	s. 37 w.	10	Walla Walla, Wash.	6	37	12	18	s. 11 w.	32
Cleveland, Ohio.	26	23	12	13	n. 18 w.	3	<i>North Pacific Coast Region.</i>						
Sandusky, Ohio †	18	12	9	11	s. 34 w.	4	North Head, Wash.	11	27	25	14	s. 34 e.	19
Toledo, Ohio.	18	21	18	18	s.	5	Port Crescent, Wash. *	13	9	9	12	n. 37 w.	5
Detroit, Mich.	19	20	19	17	s. 63 e.	2	Seattle, Wash.	18	18	24	14	e.	10
<i>Upper Lake Region.</i>													
Alpena, Mich.	22	17	20	22	n. 22 w.	5	Tacoma, Wash.	23	22	2	21	n. 87 w.	19
Escanaba, Mich.	20	23	16	20	s. 55 w.	5	Tatoosh Island, Wash.	5	25	22	19	s. 9 e.	20
Grand Rapids, Mich.	17	22	22	13	s. 61 e.	10	Portland, Oreg.	12	26	17	24	s. 27 w.	16
Houghton, Mich. †	6	5	17	10	n. 82 e.	7	Roseburg, Oreg.	14	24	15	20	s. 27 w.	11
Marquette, Mich.	19	18	12	28	n. 87 w.	16	<i>Middle Pacific Coast Region.</i>						
Port Huron, Mich.	19	23	18	13	s. 51 e.	6	Eureka, Cal.	15	27	20	18	s. 9 e.	12
Sault Ste. Marie, Mich.	14	14	20	26	w.	6	Mount Tamalpais, Cal.	24	17	7	32	n. 74 w.	26
Chicago, Ill.	18	21	20	16	s. 53 e.	5	Red Bluff, Cal.	22	25	22	7	s. 79 e.	17
Milwaukee, Wis.	20	16	17	24	n. 60 w.	8	Sacramento, Cal.	15	26	26	13	s. 50 e.	15
Green Bay, Wis.	16	28	18	18	s.	12	San Francisco, Cal.	16	17	12	30	s. 87 w.	18
Duluth, Minn.	27	5	24	23	n. 3 e.	22	<i>South Pacific Coast Region.</i>						
<i>West Indies.</i>													
Havana, Cuba †	5	1	25	3	n. 80 e.	22	Fresno, Cal.	30	12	11	29	n. 45 w.	25
San Juan, Porto Rico	4	26	39	4	s. 58 e.	41	Los Angeles, Cal.	12	13	25	24	s. 45 e.	1
Hamilton, Bermuda.							San Diego, Cal.	26	10	12	30	n. 48 w.	24

TABLE IV.—Accumulated amounts of precipitation for each 5 minutes, for storms in which the rate of fall equaled or exceeded 0.25 in any 5 minutes, or 0.75 in 1 hour during March, 1905, at all stations furnished with self-registering gages.

Stations.	Date.	Total duration.		Total amount of precipitation.	Excessive rate.		Amount before excessive began.	Depths of precipitation (in inches) during periods of time indicated.													
		From—	To—		Began—	Ended—		5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
Albany, N. Y.	21			0.80														*			
Alpena, Mich.	29-30			1.04														0.35			
Amarillo, Tex.	31			0.80														0.26			
Asheville, N. C.	20-21			0.56														0.31			
Atlanta, Ga.	29			0.10														0.08			
Atlantic City, N. J.	24-25			0.74														0.38			
Augusta, Ga.	20			0.41														0.18			
Baltimore, Md.	19			0.45																	
Binghamton, N. Y.	24-25			1.13						0.44								0.29			
Birmingham, Ala.	19-20			1.88														0.42			
Bismarck, N. Dak.	27-28			0.88														*			
Block Island, R. I.	20-21			0.93														0.16			
Boise, Idaho.	25-26			0.43														0.15			
Boston, Mass.	7-9			0.85														0.10			
Buffalo, N. Y.	18-19			0.64														*			
Cairo, Ill.	7-8			0.99														0.39			
Charleston, S. C.	11-12			1.10														0.41			
Charlotte, N. C.	11-12			0.62														0.09			
Chattanooga, Tenn.	8-9			1.50														0.30			
Chicago, Ill.	19-20			1.00														*			
Cincinnati, Ohio.	7-8			1.56														0.14			
Cleveland, Ohio.	18-19			0.78														0.18			
Columbia, Mo.	23			0.19																	
Columbia, S. C.	9	2:27 p. m.	7:49 p. m.	0.91	2:30 p. m.	2:50 p. m.	T.	0.05	0.48	0.62	0.67		0.19								
Columbus, Ohio.	7-8			1.28														0.08			
Concord, N. H.	24-25			1.53														0.27			
Corpus Christi, Tex.	19-20	3:58 p. m.	12:30 a. m.	1.06	3:45 p. m.	4:05 p. m.	0.01	0.11	0.36	0.58	0.63										
Do	28	5:25 p. m.	6:12 p. m.	0.80	5:28 p. m.	5:43 p. m.	0.01	0.33	0.71	0.79											
Davenport, Iowa.	18-19			0.96														0.26			
Denver, Colo.	20			1.56														*			
Des Moines, Iowa.	18			1.32														*			
Detroit, Mich.	19-20			0.67														0.10			
Dodge, Kans.	7			0.28														*			
Dubuque, Iowa.	18-19			0.80														0.24			
Duluth, Minn.	8-9			0.40														*			
Eastport, Me.	25-26			0.16														0.06			
Elkins, W. Va.	20-21			1.43														0.34			
Erie, Pa.	3-4			0.47														*			
Escanaba, Mich.	25-26			0.61														*			
Evansville, Ind.	67			0.91														0.30			
Fort Smith, Ark.	28			1.18														0.27			
Fort Worth, Tex.	17			0.69																	
Galveston, Tex.	28	7:15 p. m.	9:30 p. m.	0.79	7:46 p. m.	8:26 p. m.	T.	0.11	0.25	0.34	0.40	0.50	0.58	0.66	0.69	0.72					
Grand Rapids, Mich.	19			0.85														*			
Green Bay, Wis.	25-26			1.06														*			
Hannibal, Mo.	18-19			0.52														0.47			
Harrisburg, Pa.	20-21			1.17														0.16			
Hatteras, N. C.	10			0.52														*			
Huron, S. Dak.	31			0.20														0.08			
Indianapolis, Ind.	29-30			1.51														0.45			
Jacksonville, Fla.	24	11:56 a. m.	2:28 p. m.	1.83	12:04 p. m.	12:29 p. m.	0.01	0.37	0.82	1.22	1.46	1.51									
Jupiter, Fla.	12	11:20 a. m.	6:35 p. m.	1.87	1:32 p. m.	2:47 p. m.	0.22	0.28	0.60	0.85											
Do	22	12:58 p. m.	2:30 p. m.	1.36	1:43 p. m.	2:12 p. m.	0.01	0.06	0.30	0.70	1.01	1.18	1.27								
Kalispell, Mont.	30			0.47														*			
Kansas City, Mo.	27-28			1.74														0.66			
Key West, Fla.	13	1:55 p. m.	3:40 p. m.	1.22	1:59 p. m.	2:34 p. m.	T.	0.13	0.33	0.57	0.82	0.95	1.08	1.19							
Do	30	3:30 a. m.	4:15 p. m.	4.49	11:25 a. m.	12:15 p. m.	2.50	0.11	0.20	0.47	0.62	0.75	0.82	0.96	1.07	1.14	1.26				
Knoxville, Tenn.	8-9			2.94																	
La Crosse, Wis.	17-18			0.78														0.33			
Lexington, Ky.	20-21			1.79														0.17			
Lincoln, Nebr.	18			0.34														0.33			
Little Rock, Ark.	7-8			1.04														0.11			
Los Angeles, Cal.	13	9:55 a. m.	11:15 a. m.	0.88	10:10 a. m.	10:35 a. m.	0.01	0.06	0.19	0.33	0.49	0.66	0.68					0.26			
Louisville, Ky.	29			0.57														0.24			
Lynchburg, Va.	21			0.63														0.44			
Macon, Ga.	9			0.67														0.53			
Memphis, Tenn.	8-9			2.82														0.37			
Meridian, Miss.	8-9			0.83														0.29			
Milwaukee, Wis.	19			1.05														*			
Minneapolis, Minn.	18			0.23														*			
Montgomery, Ala.	19-20			1.57														0.59			
Nantucket, Mass.	9-10			0.92														0.31			
Nashville, Tenn.	19-20			1.90																	
New Haven, Conn.	20-21			0.98						0.42								0.17			
New Orleans, La.	19-20	1:00 p. m.	4:00 a. m.	4.88	1:40 p. m.	3:00 p. m.	0.31	0.10	0.33	0.50	0.75	0.94	1.05	1.09	1.12	1.22	1.39	1.70	2.14		
New York, N. Y.	20-21			1.27														0.17			
Norfolk, Va.	9-10	7:30 p. m.	5:45 a. m.	1.51	7:41 p. m.	8:14 p. m.	0.01	0.08	0.14	0.16	0.23	0.41	0.50	0.54							
Northfield, Vt.	24-25			0.91														*			
North Head, Wash.	24			0.59																	
Oklahoma, Okla.	7-8			1.42														0.29			
Omaha, Nebr.	16-17			0.34														0.38			
Palestine, Tex.	28	12:55 p. m.	4:50 p. m.	0.91	1:35 p. m.	2:25 p. m.	0.06	0.10	0.18	0.23	0.37	0.45	0.56	0.62	0.67	0.72		0.16			
Parkersburg, W. Va.	8			0.76														0.22			
Pensacola, Fla.	20	4:15 a. m.	6:45 a. m.	1.84	4:36 a. m.	5:34 a. m.	0.03	0.11	0.31	0.50	0.71	0.82	1.03	1.25	1.39	1.47	1.54	1.70			
Philadelphia, Pa.	19			0.48					0.41												
Pittsburg, Pa.	7-8			1.36														0.13			
Pocatello, Idaho.	26-27			0.68														*			
Portland, Me.	25			0.17														0.16			
Portland, Oreg.	23-24			0.92														0.17			
Pueblo, Colo.	17-18			0.76														0.33			
Raleigh, N. C.	21			0.48																	
Richmond, Va.	24			0.56						0.42											
Rochester, N. Y.	19-20			0.30														0.34			
Sacramento, Cal.	13			0.50														*			
St. Louis, Mo.	28-29			1.01														0.42			
St. Paul, Minn.	18			0.38														0.18			
Salt Lake City, Utah.	29-30			0.83														0.22			
San Antonio, Tex.	20-21	9:15 p. m.	2:50 a. m.	0.70	9:26 p. m.	9:54 p.															

TABLE IV.—Accumulated amounts of precipitation for each 5 minutes, etc.—Continued.

Stations.	Date.	Total duration.		Total amount of precipitation.	Excessive rate.		Amount before excessive began.	Depths of precipitation (in inches) during periods of time indicated.													
		From—	To—		Began—	Ended—		5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
Savannah, Ga.	15-16	9:30 p. m.	12:15 p. m.	2.12	1:30 a. m.	2:30 a. m.	0.39	0.05	0.11	0.16	0.23	0.30	0.40	0.48	0.56	0.61	0.67	0.75			
Scranton, Pa.	20-21			1.25														0.10			
Seattle, Wash.	24-25			0.75														0.19			
Shreveport, La.	7-8	7:45 p. m.	3:30 p. m.	2.68	11:20 a. m.	12:20 p. m.	1.64	0.06	0.16	0.24	0.32	0.40	0.48	0.54	0.61	0.64	0.69	0.77			
Spokane, Wash.	20-21			0.28														0.16			
Springfield, Ill.	23			0.31														0.18			
Springfield, Mo.	5-8			3.44														•			
Syracuse, N. Y.	21			1.07														•			
Tampa, Fla.	12			0.63														•			
Taylor, Tex.	17-18	7:05 p. m.	6:30 a. m.	1.35	12:28 a. m.	1:03 a. m.	0.09	0.28	0.42	0.50	0.58	0.69	0.74	0.79	0.82	0.85	0.89	0.91			
Toledo, Ohio.	29-30			0.42														0.99			
Topeka, Kans.	27-28	5:55 p. m.	5:30 a. m.	2.69	9:50 p. m.	10:41 p. m.	0.49	0.08	0.13	0.28	0.32	0.51	0.64	0.80	0.95	1.13	1.31	0.14			
Vicksburg, Miss.	28-29	9:25 p. m.	D. N.	1.18	11:10 p. m.	11:47 p. m.	0.15	0.10	0.15	0.21	0.30	0.41	0.49	0.62							
Washington, D. C.	24	6:55 p. m.	11:09 p. m.	1.45	7:17 p. m.	8:07 p. m.	0.03	0.12	0.20	0.23	0.34	0.49	0.69	0.76	0.82	0.93	0.98				
Wichita, Kans.	27	3:45 p. m.	6:50 p. m.	1.90	4:15 p. m.	5:18 p. m.	0.05	0.10	0.27	0.50	0.54	0.63	0.72	0.84	0.94	1.16	1.24	1.60			
Williston, N. Dak.	21-22			0.16														0.06			
Wilmington, N. C.	9-10			0.71														0.30			
Wytheville, Va.	9-10			0.34														0.33			
Yankton, S. Dak.	18			1.77														•			
Havana, Cuba	30-31			2.05														•			
San Juan, Porto Rico	3-4			1.01										0.39							

*Self-register not working

TABLE V.—Data furnished by the Canadian Meteorological Service, March, 1905.

Stations.	Pressure, in inches.			Temperature.				Precipitation.			Stations.	Pressure, in inches.			Temperature.				Precipitation.		
	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hours.	Departure from normal.	Mean.	Departure from normal.	Mean maximum.	Mean minimum.	Total.	Departure from normal.	Total snowfall.		Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hours.	Departure from normal.	Mean.	Departure from normal.	Mean maximum.	Mean minimum.	Total.	Departure from normal.	Total snowfall.
<i>Ins.</i>	<i>Ins.</i>	<i>Ins.</i>	°	°	°	°	<i>Ins.</i>	<i>Ins.</i>	<i>Ins.</i>	<i>Ins.</i>	<i>Ins.</i>	<i>Ins.</i>	<i>Ins.</i>	°	°	°	°	<i>Ins.</i>	<i>Ins.</i>	<i>Ins.</i>	
St. John's, N. F.	29.99	30.03	+ .15	23.1	- 3.1	33.6	12.6	2.03	-2.90	8.0	Parry Sound, Ont.	29.32	30.10	+ .08	23.6	+ 2.5	35.5	11.8	3.12	+0.89	10.5
Sydney, C. B. I.	29.95	30.06	+ .12	27.7	- 1.3	36.5	18.8	2.81	-2.65	11.6	Port Arthur, Ont.	29.33	30.06	+ .01	21.6	+ 4.8	31.4	11.8	1.43	+0.46	5.5
Halifax, N. S.	29.95	30.03	+ .08	29.7	- 0.1	36.7	22.7	1.68	-2.60	5.8	Winnipeg, Man.	29.16	30.03	° .06	23.8	+11.5	32.9	14.8	1.78	+0.75	7.0
Grand Manan, N. B.	29.98	30.03	+ .10	29.7	- 0.1	36.7	22.7	1.68	-2.60	5.8	Minnedosa, Man.	28.16	30.04	° .02	26.8	+14.3	38.0	15.6	1.07	+0.42	7.0
Yarmouth, N. S.	30.01	30.08	+ .13	30.0	- 0.8	36.8	23.2	1.45	-3.40	7.1	Qu'Appelle, Assin.	27.66	29.96	° .08	30.9	+16.0	42.2	19.6	0.26	-0.51	1.8
Charlottetown, P. E. I.	29.98	30.02	+ .12	22.0	- 3.4	31.1	13.0	2.68	-0.53	7.9	Medicine Hat, Assin.	27.61	29.91	° .09	40.6	+13.1	53.0	28.3	0.55	-0.21	0.5
Chatham, N. B.	29.97	30.00	+ .10	24.5	+ 1.5	37.6	11.4	1.56	-1.91	1.9	Swift Current, Assin.	27.35	29.96	° .06	35.4	+13.4	46.2	24.6	0.20	-0.61	0.4
Father Point, Que.	29.97	30.00	+ .10	23.0	+ 2.7	31.8	14.2	1.15	-1.58	2.6	Calgary, Alberta	26.33	29.91	° .04	36.0	+9.8	47.1	24.8	0.65	-0.07	5.7
Quebec, Que.	29.72	30.06	+ .10	22.8	+ 1.6	31.5	14.1	1.78	-1.48	4.7	Banff, Alberta	25.27	29.91	° .03	33.8	+5.8	43.2	24.5	0.93	-0.48	6.5
Montreal, Que.	29.88	30.10	+ .10	25.0	+ 1.2	32.1	17.8	2.14	-1.65	2.6	Edmonton, Alberta.	27.66	29.88	° .08	35.4	+11.2	46.4	24.4	0.48	-0.24	1.7
Rockliffe, Ont.	29.46	30.02	+ .01	20.6	+ 1.6	35.4	5.8	0.38	-1.68	2.2	Prince Albert, Sask.	28.84	29.94	° .14	26.3	+14.3	37.2	15.4	0.40	-0.87	4.0
Ottawa, Ont.	29.73	30.07	+ .06	24.0	+ 2.5	33.0	14.9	1.20	-1.52	2.8	Battleford, Sask.	28.20	29.98	° .08	32.0	+18.9	43.6	20.4	0.07	-0.39	0.3
Kingston, Ont.	29.78	30.11	+ .10	25.1	+ 0.5	34.8	15.5	1.18	-1.46	2.5	Kamloops, B. C.	28.62	29.85	° .07	45.4	+9.3	55.7	35.2	0.00	-0.57	
Toronto, Ont.	29.72	30.12	+ .10	30.6	+ 3.3	38.7	22.5	0.50	-2.14	1.7	Victoria, B. C.	29.81	29.91	° .06	47.9	+6.0	53.1	42.6	1.39	-1.73	
White River, Ont.	28.72	30.09	+ .06	14.0	+ 1.8	29.4	1.5	2.31	+0.93	8.1	Barkerville, B. C.	25.52	29.85	° .03	32.9	+ 6.8	41.4	24.4	1.60	-0.29	7.0
Port Stanley, Ont.	29.44	30.10	+ .07	29.5	+ 2.3	38.2	20.8	1.63	-1.25	4.2	Hamilton, Bermuda...	30.01	30.18	+ .10	64.1	+ 1.9	69.3	58.9	1.74	-3.39	
Saugeen, Ont.	29.37	30.11	+ .08	27.4	+ 2.7	38.5	16.2	2.33	-0.32	6.0											

TABLE VI.—Heights of rivers referred to zeros of gages, March, 1905.

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.	Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.						Height.	Date.	Height.	Date.		
<i>Milk River.</i>	<i>Miles.</i>	<i>Feet.</i>	<i>Feet.</i>		<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>	<i>Missouri River—Cont'd.</i>	<i>Miles.</i>	<i>Feet.</i>	<i>Feet.</i>		<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>
Havre, Mont.....	237	9	4.6	8	3.4	31	4.0	1.2	Bismarck, N. Dak.....	1,309	14	9.1	23	0.6	29,30	3.6	8.5
<i>Musselshell River.</i>									Pierre, S. Dak. (*).....	1,114	14	6.8	26	2.4	12	3.8	4.4
Musselshell, Mont.....	87	9	1.0	4,5,7	0.2	1	0.6	0.8	Sioux City, Iowa.....	784	19	9.4	29	5.8	14	6.8	3.6
<i>Yellowstone River.</i>									Blair, Nebr.....	705	15	9.1	30	4.9	14	6.2	4.2
Billings, Mont. (*).....	330	8	— 0.3	16-23	— 0.4	24-31	— 0.4	0.1	Omaha, Nebr.....	669	10	9.4	30	6.2	16	7.2	3.2
Glendive, Mont. (*).....	78	17	4.6	16	1.2	28-31	2.0	3.4	Plattsmouth, Nebr.....	641	17	5.7	30	3.4	16	4.6	2.3
<i>Cheyenne River.</i>									St. Joseph, Mo.....	481	10	7.9	1	2.0	18	3.7	5.9
Roseau, S. Dak. (*).....	7	9	0.7	16	0.1	25-27,30,31	0.3	0.6	Kansas City, Mo.....	388	21	16.6	2	9.1	18,19	11.5	7.5
<i>James River.</i>									Glasgow, Mo.....	231	18	14.2	3	8.0	25,28	10.7	6.2
Lamoure, N. Dak. (b).....	330	14	— 0.1	24	— 1.2	31	.....	1.1	Boonville, Mo.....	199	20	15.4	3	8.3	20,21	10.8	7.1
Huron, S. Dak. (c).....	139	9	1.6	7	0.1	18	0.8	1.5	Hermann, Mo. (*).....	103	24	16.0	4	9.8	30	.....	6.2
<i>Big Blue River.</i>									<i>Minnesota River.</i>								
Blue Rapids, Kans.....	42	18	12.8	1	5.4	28-31	7.2	7.4	Mankato, Minn.....	127	18	6.7	23,24	3.5	14	5.2	3.2
<i>Republican River.</i>									St. Croix River.....								
Clay Center, Kans.....	45	22	10.7	1	7.3	30,31	8.1	3.4	Stillwater, Minn. (24).....	23	11	6.0	29	5.2	25	.....	0.8
<i>Solomon River.</i>									Chippewa River.....								
Beloit, Kans.....	75	16	4.4	1	0.6	30	1.7	3.8	Chippewa Falls, Wis. (25)...	77	14	9.5	30	2.0	23	.....	7.5
<i>Snaky Hill River.</i>									Red Cedar River.....								
Lindsborg, Kans.....	109	20	3.7	1	1.8	27,30	2.6	1.9	Cedar Rapids, Iowa.....	57	.....	9.0	23	3.6	1-4	5.7	5.4
Abilene, Kans.....	45	22	11.4	1	1.9	30,31	3.5	9.5	<i>Iowa River.</i>								
<i>Kansas River.</i>									Iowa City, Iowa.....	205	19	6.5	25,26	0.4	1	3.7	6.1
Manhattan, Kans.....	160	18	9.5	1	3.3	30	4.9	6.2	<i>Des Moines River.</i>								
Topeka, Kans.....	87	21	12.5	2	7.1	22,23	8.7	5.4	Des Moines, Iowa.....	135	14	10.0	3	4.1	17	6.2	5.9
<i>Ogave River.</i>									<i>Illinois River.</i>								
Bagnell, Mo.....	70	28	13.2	1	3.2	31	5.7	10.0	Peoria, Ill.....	35	8	15.3	8	12.2	1	14.0	3.1
<i>Gaseonade River.</i>									Beardstown, Ill.....	70	12	13.8	7-9	11.7	28-30	12.7	2.1
Arlington, Mo.....	98	16	11.6	9	0.3	26-29	2.3	11.3	<i>Red Bank Creek.</i>								
<i>Missouri River.</i>									Brookville, Pa.....	42	8	7.6	19	1.0	1-9,12-17	1.7	6.6
Townsend, Mont. (*).....	2,504	11	3.9	16,17	3.7	25-31	3.8	0.2	<i>Clarion River.</i>								
Fort Benton, Mont. (*).....	2,285	12	1.4	17	1.0	29-31	1.2	0.4	Clarion, Pa.....	32	10	16.0	20	— 0.1	7	4.9	16.0
Wolf Point, Mont. (*).....	1,952	17	3.4	17	— 0.7	27,28	0.6	4.1									

TABLE VI.—Heights of rivers referred to zeros of gages.—Continued.

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.	Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.						Height.	Date.	Height.	Date.		
Onemah River.	<i>Miles.</i>	<i>Feet.</i>	<i>Feet.</i>		<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>	Black River.	<i>Miles.</i>	<i>Feet.</i>	<i>Feet.</i>		<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>
Johnstown, Pa.	64	7	9.0	21	2.6	2	4.6	6.4	Blackrock, Ark.	67	12	13.0	13, 14	4.8	1	Feet.	8.2
Allegheny River.									White River.								
Warren, Pa. (16)	177	14	13.5	20	1.5	17	.....	12.0	Calico Rock, Ark.	272	15	13.8	10	2.8	28, 29	5.7	11.0
Oil City, Pa.	123	13	17.6	20	2.4	1, 5-7	6.6	15.2	Batesville, Ark.	217	18	17.1	10	5.2	29	8.0	11.9
Parker, Pa. (17)	73	20	22.0	20	7.5	31	.....	14.5	Newport, Ark.	185	26	20.5	13	5.8	8	11.4	14.7
Freeport, Pa. (9)	29	20	32.0	20	6.7	17	14.5	25.3	Clarendon, Ark.	75	30	24.1	22-24	12.3	1	20.6	11.8
Springdale, Pa.	17	27	32.3	21	8.8	4	16.0	23.5	Arkansas River.								
Chester River.									Wichita, Kans.	832	10	2.3	1	0.8	27, 31	1.2	1.5
Rowlesburg, W. Va. (7) ..	36	14	10.0	10	3.0	31	4.8	7.0	Tulsa, Ind. T.	551	16	5.4	19	3.3	3-5, 16, 17	3.8	2.1
Youghiogheny River.									Webbers Falls, Ind. T.	465	23	15.0	20	6.4	5	8.9	8.6
Confluence, Pa. (7)	59	10	8.8	21	2.6	31	4.9	6.2	Fort Smith, Ark.	403	22	16.0	21	6.5	6	9.6	9.5
West Newton, Pa. (7)	15	23	14.1	21	2.8	31	7.2	11.3	Dardanelle, Ark.	256	21	16.0	22	6.2	7	9.9	9.8
Monongahela River.									Little Rock, Ark.	176	23	16.9	23	8.3	8	11.5	8.6
Weston, W. Va.	161	18	13.0	10	0.0	31	1.4	13.0	Yazoo River.								
Fairmont, W. Va.	119	25	29.3	10	15.2	19	17.5	14.1	Greenwood, Miss.	175	38	29.2	1	26.0	29	27.7	3.2
Greensboro, Pa.	81	18	27.2	10	8.2	4, 5	11.5	19.0	Yazoo City, Miss.	80	25	21.5	20-22, 29	20.0	5-8	20.9	1.5
Lock No. 4, Pa.	40	28	32.1	10	8.1	5	13.6	24.0	Ouachita River.								
Beaver River.									Camden, Ark.	304	39	35.1	15	11.6	7, 8	22.8	23.5
Ellwood Junction, Pa.	10	14	9.6	20	2.3	2, 3, 16-18	4.1	7.3	Monroe, La.	122	40	36.8	25	28.8	12, 14	31.1	8.0
Muskingum River.									Red River.								
Zanesville, Ohio.	70	25	18.9	9	9.5	31	12.9	9.4	Arthur City, Tex.	688	27	15.5	21	6.3	6, 7	9.5	9.2
Little Kanawha River.									Kiamachee, Tex.	614	27	13.7	21	3.3	7	6.7	10.4
Glenview, W. Va.	77	20	23.5	10	0.0	5, 18, 30, 31	2.9	23.5	Fulton, Ark.	515	28	22.1	13	8.2	8	16.1	13.9
Creston, W. Va.	38	20	23.5	10	3.7	18, 19, 31	5.5	19.8	Spring Bank, Ark.	441	29	25.1	24	11.0	9	19.2	14.1
New River.									Shreveport, La.	327	29	16.1	25	6.8	7, 8	12.2	9.3
Radford, Va.	155	14	5.0	11	0.8	27-29	1.6	4.2	Alexandria, La.	118	33	24.8	22	12.5	9	19.3	12.3
Hinton, W. Va.	95	14	9.0	10	2.5	30, 31	4.1	6.5	Mississippi River.								
Great Kanawha River.									St. Cloud, Minn. (21) ..	2,034	4	0.4	25	0.2	27-30	.....	0.2
Charleston, W. Va.	58	30	28.5	10	5.3	31	9.2	23.2	St. Paul, Minn. (9) ..	1,954	14	5.9	28	3.4	15, 19, 20	4.5	2.5
Scioto River.									Red Wing, Minn. (15) ..	1,914	14	5.9	31	2.9	16-18	3.9	3.0
Columbus, Ohio.	110	17	7.0	9	2.7	30	4.3	4.3	Reeds Landing, Minn.	1,884	12	5.9	31	0.4	1	2.8	5.5
Licking River.									La Crosse, Wis. (25) ..	1,819	12	8.1	31	6.2	25	.....	1.9
Falmouth, Ky.	30	25	18.4	11	2.8	6, 7, 19, 20	6.9	15.6	Prairie du Chien, Wis. (25) ..	1,759	18	9.2	26	8.6	29, 30	.....	0.6
Mianus River.									Dubuque, Iowa (25) ..	1,699	18	10.2	26	9.4	24, 31	.....	0.8
Dayton, Ohio.	77	18	5.0	9	1.4	29-31	2.3	3.6	Clinton, Iowa (25) ..	1,629	16	9.8	27	8.6	24	.....	1.2
Kentucky River.									Leclaire, Iowa (15) ..	1,609	10	6.8	27	5.4	19	.....	1.4
Jackson, Ky.	287	24	21.3	10	5.0	1-7	6.6	16.3	Davenport, Iowa (17) ..	1,593	15	10.0	27, 28	7.0	18, 19	.....	3.0
Beattyville, Ky.	254	30	22.0	10	1.5	5-7	3.6	20.5	Muscatoine, Iowa	1,562	16	11.7	28, 29	5.4	1	8.7	6.3
High Bridge, Ky.	117	17	22.8	10	10.6	6-7	13.3	12.2	Galland, Iowa (3) ..	1,472	8	6.5	30	3.0	4	4.4	3.5
Frankfort, Ky.	65	31	20.4	11	7.0	6	9.7	13.4	Keokuk, Iowa (2) ..	1,463	15	11.5	30	5.6	12	7.9	5.9
Wabash River.									Warsaw, Ill.	1,458	18	14.4	30	8.6	13	10.9	5.8
Terre Haute, Ind.	171	16	15.2	5	3.0	18-20	6.9	12.2	Hannibal, Mo.	1,402	13	12.7	31	6.9	14	9.0	5.8
Mount Carmel, Ill.	75	15	14.7	3	6.0	31	10.1	8.7	Grafton, Ill.	1,306	23	14.3	31	10.3	15, 16	11.7	4.0
Cumberland River.									St. Louis, Mo.	1,264	30	19.5	5	12.4	21	15.9	7.1
Burnside, Ky.	518	50	35.0	11	3.0	7, 8	8.5	32.0	Chester, Ill.	1,189	30	17.3	6	11.0	22	14.2	6.3
Celina, Tenn.	383	45	31.5	12	4.7	8	11.9	25.8	Cape Girardeau, Mo.	1,128	28	21.2	6	15.6	22	18.8	5.6
Carthage, Tenn.	308	40	28.6	13	4.3	8	11.0	24.3	New Madrid, Mo.	1,003	34	30.7	18, 19	21.9	1	26.7	8.8
Nashville, Tenn.	193	40	31.4	14	10.0	8	17.1	21.4	Luxora, Ark.	905	33	25.0	19, 20	13.8	1	20.3	11.2
Clarksville, Tenn.	126	42	39.2	16	10.6	8	20.9	28.6	Memphis, Tenn.	843	33	29.0	21	16.6	1	24.3	12.4
Powell River.									Helena, Ark.	767	42	37.0	22, 23	20.9	1	31.7	16.1
Tazewell, Tenn.	44	20	10.5	11	1.2	8	2.4	9.3	Arkansas City, Ark.	635	42	39.8	26	21.3	1	34.3	18.5
Clinch River.									Greenville, Miss.	595	42	33.9	26	16.7	1	28.9	17.2
Speers Ferry, Va.	156	20	8.0	10	0.4	31	1.6	7.6	Vicksburg, Miss.	474	45	37.7	26, 27, 29	18.2	1	31.6	19.5
Clinton, Tenn.	52	25	18.4	12	5.4	30, 31	8.1	13.0	Natchez, Miss.	373	46	38.0	29, 30	21.5	1, 2	32.0	16.5
South Fork Holston River.									Baton Rouge, La.	240	35	27.8	29, 31	15.8	2	23.2	12.0
Bluff City, Tenn.	35	15	4.5	10	1.4	27-29, 31	2.1	3.1	Donaldsonville, La.	188	28	21.7	29, 31	11.2	3	17.6	10.5
Holston River.									New Orleans, La.	108	16	14.0	29	7.5	2-4	11.2	6.5
Rotherwood, Tenn.	142	14	4.7	11	1.0	28, 29	1.8	3.7	Atchafalaya River.								
Rogersville, Tenn.	103	14	6.3	11	2.4	24-31	3.2	3.9	Simmesport, La.	127	.....	32.9	30, 31	21.3	2, 3	28.2	11.6
French Broad River.									Melville, La.	103	31	32.3	30, 31	24.4	2, 3	29.3	7.9
Asheville, N. C.	144	6	1.0	11	— 0.2	29, 31	0.2	1.2	Morgan City, La.	19	8	5.5	10	2.5	4	3.5	3.0
Leadvale, Tenn.	70	15	3.0	11	— 1.0	30	0.4	4.0	Grand River.								
Dandridge, Tenn.	46	15	3.6	10, 11	1.3	29-31	1.9	2.3	Grand Rapids, Mich.	38	11	11.8	27	1.6	14	5.1	10.2
Little Tennessee River.									Penobscot River.								
McGhee, Tenn.	17	20	7.4	10	3.9	29, 30	4.5	3.5	Mattawamkeag, Me. (21) ..	87	.....	.....	.....	.....	.....	.....	.....
Huachuque River.									West Enfield, Me. (20) ..	60	.....	.....	.....	.....	.....	.....	.....
Charleston, Tenn.	18	22	5.5	11	2.2	23, 27-29	2.9	3.3	Kennebec River.								
Tennessee River.									Winslow, Me.	46	.....	7.7	31	3.0	19	4.4	4.7
Knoxville, Tenn.	635	29	10.2	10	2.1	30, 31	3.9	8.1	Merrimac River.								
Loudon, Tenn.	590	25	8.8	11	2.3	30, 31	3.8	6.5	Franklin Junction, N. H. (9) ..	110	.....	12.6	30	3.7	19	5.9	8.9
Kington, Tenn.	556	25	11.9	11	3.0	29-31	5.0	8.9	Concord, N. H. (19) ..	94	.....	6.8	30, 31	1.1	20	.....	5.7
Chattanooga, Tenn.	452	33	17.3	12	4.9	31	8.0	12.4	Manchester, N. H.	68	.....	5.6	31	2.1	4	3.2	3.5
Bridgeport, Ala.	402	24	13.9	12	3.3	31	6.3	10.6	Connecticut River.								
Guntersville, Ala.	349	31	20.9	13	6.5	31	10.9	14.4	Wells River, Vt. (25) ..	255	.....	29.8	31	26.8	26	.....	3.0
Florence, Ala.	255	16	12.7	13, 14	4.0	31	7.4	8.7	Whiteriver Junction, Vt. (25) ..	209	.....	20.2	31	13.6	27	.....	6.6
Riverton, Ala.	225	26	20.9	14	6.9	31	12.1	14.0	Bellows Falls, Vt.	170	12	11.4	31	— 0.5	3, 4	2.3	11.9
Johnsonville, Tenn.	95	21	21.2	1, 13	7.3	31	13.5	13.9	Holyoke, Mass.	84	9	10.0	31	0.0	4, 9, 15	2.9	10.0
Ohio River.									Hartford, Conn. (19) ..	50	13	22.0	31	5.1	19	.....	16.9
Pittsburg, Pa.	966	22	29.0	22	3.6	4	12.2	25.4	Housatonic River.								
Davis Island Dam, Pa.	960	25	27.1	22	5.9	5	12.8	21.2	Gaylordsville, Conn.	44	15	9.1	28	4.1	5, 6, 8	5.9	5.0
Beaver Dam, Pa.	925	27	39.1	22	7.4	5	18.3	31.7	Mohawk River.								

TABLE VI.—Heights of rivers referred to zeros of gages—Continued.

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.	Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.						Height.	Date.	Height.	Date.		
<i>North Branch Susquehanna.</i>	<i>Miles.</i>	<i>Feet.</i>	<i>Feet.</i>		<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>	<i>Chattahoochee River—Con.</i>	<i>Miles.</i>	<i>Feet.</i>	<i>Feet.</i>		<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>
Binghamton, N. Y.	183	16	14.9	26	2.1	4, 6, 8, 9	5.9	12.8	Alaga, Ala.	30	25	10.6	13, 22	5.8	31	7.9	4.8
Towanda, Pa. (10)	139	16	15.0	26	8.0	19	7.0	7.0	<i>Coosa River.</i>								
Wilkesbarre, Pa.	60	17	23.4	26	3.3	8	10.4	20.1	Rome, Ga.	271	30	8.0	22	2.5	30, 31	3.6	5.5
<i>West Branch Susquehanna.</i>									Gadsden, Ala.	144	22	8.7	23	2.6	19, 20, 31	4.5	6.1
Clearfield, Pa. (7)	165	8	9.5	19	2.1	31	3.6	7.4	Lock No. 4, Ala.	116	17	7.2	23, 24	2.7	31	4.3	4.5
Lockhaven, Pa. (18)	65	12	9.0	20	— 2.0	31	—	11.0	Wetumpka, Ala.	6	45	20.4	21	7.1	19	10.7	13.3
Williamsport, Pa.	39	20	19.4	20	2.2	1, 2	7.3	17.2	<i>Tallapoosa River.</i>								
<i>Juniata River.</i>									Millstead, Ala.	38	35	9.7	22	2.7	19, 20	4.1	7.0
Huntingdon, Pa.	90	24	9.7	21	3.4	4	5.3	6.3	<i>Alabama River.</i>								
<i>Susquehanna River.</i>									Montgomery, Ala.	265	35	17.5	22	4.4	19	8.2	13.1
Selinsgrove, Pa. (9)	116	17	13.4	21	2.4	10	7.9	11.0	Selma, Ala.	212	35	23.0	23	7.2	8, 9, 19	11.7	15.8
Harrisburg, Pa.	69	17	15.9	22	3.4	5	8.1	12.5	<i>Black Warrior River.</i>								
<i>Shenandoah River.</i>									Tuscaloosa, Ala.	90	43	27.1	11	9.9	31	14.7	17.2
Riverton, Va.	58	22	8.0	1-11	0.5	14-21, 28-31	3.7	7.5	<i>Tombigbee River.</i>								
<i>Potomac River.</i>									Columbus, Miss.	303	33	11.2	22	3.0	31	6.5	8.2
Cumberland, Md.	290	8	8.9	22	3.0	4	5.7	5.9	Vienna, Ala.	233	42	29.2	1	4.9	31	9.5	24.3
Harpers Ferry, W. Va.	172	18	12.0	11	2.0	1, 4	6.1	10.0	Demopolis, Ala.	155	35	49.2	1	12.5	31	26.7	36.7
<i>James River.</i>									<i>Leaf River.</i>								
Buchanan, Va.	305	12	11.4	10	3.4	31	5.0	8.0	Hattiesburg, Miss.	60	20	11.8	21	4.5	9	5.7	7.3
Lynchburg, Va.	260	18	8.2	10	1.8	30, 31	3.1	6.4	<i>Chickasawhay River.</i>								
Columbia, Va.	167	18	15.6	11	4.0	31	7.3	11.6	Enterprise, Miss.	144	18	9.5	23	3.5	8	5.4	6.0
Richmond, Va.	111	12	5.8	12	0.5	19, 20	1.5	5.3	Shubuta, Miss.	106	25	14.0	1	3.0	14-20	5.9	11.0
<i>Dan River.</i>									<i>Pascagoula River.</i>								
Danville, Va.	55	8	1.2	11	0.0	8	0.4	1.2	Merrill, Miss.	78	20	19.6	23	7.7	8	12.8	11.9
<i>Roanoke River.</i>									<i>Pearl River.</i>								
Clarksville, Va.	196	12	3.4	12, 13	0.6	31	1.6	2.8	Jackson, Miss.	242	20	21.3	1	7.7	18	13.3	13.6
Weldon, N. C.	129	30	19.9	1	10.2	31	12.9	9.7	Columbia, Miss.	110	14	17.5	1	8.9	18	12.8	8.6
<i>Tar River.</i>									<i>Sabine River.</i>								
Tarboro, N. C. (*)	46	25	17.0	16	7.3	31	10.2	9.7	Logansport, La.	315	25	26.8	13	7.8	8	19.7	19.0
Greenville, N. C.	21	22							<i>Neches River.</i>								
<i>Cape Fear River.</i>									Rockland, Tex.	105	20	18.4	22	5.0	8	11.2	13.4
Moncure, N. C.	171	25	11.6	13	2.2	31	3.8	9.4	Beaumont, Tex.	18	10	5.4	25, 26	1.4	13	3.1	4.0
Fayetteville, N. C.	112	38	22.3	14	7.7	31	11.9	14.6	<i>Trinity River.</i>								
<i>Waccamaw River.</i>									Dallas, Tex.	320	25	25.1	19	3.2	3, 4, 6, 7	7.9	21.9
Conway, S. C.	40	7	6.8	2-4, 6, 7	5.0	31	6.0	1.8	Long Lake, Tex.	211	35	32.2	25, 26	4.4	7	18.0	27.8
<i>Pedee River.</i>									Riverside, Tex.	112	40	24.4	29	2.3	7, 8	14.5	22.1
Cheraw, S. C.	149	27	11.6	15	2.7	31	5.1	8.9	Liberty, Tex.	20	25	24.3	25	6.6	8	17.5	17.7
Smiths Mills, S. C.	51	16	17.1	2, 3	8.5	31	12.5	8.6	<i>Brazos River.</i>								
<i>Lynch Creek.</i>									Kopperl, Tex. (7)	345	21	5.0	25	0.0	7, 8, 11-15	1.3	5.0
Edinburgh, S. C.	35	12	12.0	1, 2	6.0	10-13, 28-31	7.7	6.0	Waco, Tex.	285	24	8.2	18	3.1	3-7	4.4	5.1
<i>Black River.</i>									Valley Junction, Tex.			13.5	19	0.1	4	4.7	13.4
Kingsree, S. C.	45	12	10.5	2	7.4	12	8.9	3.1	Hempstead, Tex.	140	40	21.0	21	0.0	2	9.3	21.0
<i>Catawba River.</i>									Booth, Tex.	61	39	21.7	21	5.2	4	10.9	16.5
Mount Holly, N. C.	28	15	2.3	12	1.6	30, 31	1.9	0.7	<i>Colorado River.</i>								
<i>Wateree River.</i>									Ballinger, Tex.	489	21	4.5	17	1.6	1-8	2.1	2.9
Camden, S. C.	37	24	11.1	14	5.7	31	7.6	5.4	Austin, Tex.	214	18	6.0	19	1.2	4-7	2.1	4.8
<i>Ongaree River.</i>									Columbus, Tex.	98	24	19.5	22	6.0	5-7	10.6	13.5
Columbia, S. C.	52	15	2.5	13	0.7	3	1.4	1.8	<i>Guadalupe River.</i>								
<i>Santee River.</i>									Gonzales, Tex.	112	22	5.6	19	0.7	1-7	1.5	4.9
St. Stephens, S. C.	50	12	11.0	2	4.0	31	7.7	7.0	Victoria, Tex.	35	16	14.7	17	1.7	4-6	5.6	13.0
<i>Edisto River.</i>									<i>Red River of the North.</i>								
Edisto, S. C.	75	6	5.0	1, 15-17	3.3	31	4.4	1.7	Moorhead, Minn.	284	26	9.5	31	7.7	1	8.3	1.8
<i>Broad River.</i>									<i>Kootenai River.</i>								
Carlton, Ga.	30	11	2.6	13	2.1	28-31	2.3	0.5	Bonnara Ferry, Idaho (1)	123	24	0.5	26-28	— 1.6	1	— 0.2	2.1
<i>Savannah River.</i>									<i>Pend & Oreille River.</i>								
Calhoun Falls, S. C.	347	15	3.5	14	2.6	30, 31	3.0	0.9	Newport, Wash.	86	14	0.0	30, 31	— 1.4	1, 2	— 0.6	1.4
Augusta, Ga.	268	32	12.6	13	7.8	28, 31	8.9	4.8	<i>Snake River.</i>								
<i>Oconee River.</i>									Lewiston, Idaho	144	24	4.3	31	3.3	3	3.8	1.0
Milledgeville, Ga.	147	25	6.2	13	2.6	30, 31	3.4	3.6	<i>Columbia River.</i>								
Dublin, Ga.	79	30	7.3	14, 15	1.9	31	3.9	5.4	Wenatchee, Wash.	473	40	7.0	30, 31	3.7	1, 2	5.4	3.3
<i>Ocmulgee River.</i>									Umatilla, Ore.	270	25	4.8	30	0.3	1, 2	2.9	4.5
Macon, Ga.	203	18	5.7	13	2.4	31	3.6	3.3	The Dalles, Ore.	166	40	7.0	29, 30	2.0	1	4.8	5.0
Abbeville, Ga.	96	11	9.9	1	3.8	31	7.7	4.1	<i>Willamette River.</i>								
<i>Plat River.</i>									Eugene, Ore.	183	10	9.0	26	3.2	9-13	4.6	5.8
Woodbury, Ga.	227	10	1.3	13, 23	0.5	31	0.9	0.8	Albany, Ore.	118	20	13.0	27	2.4	15, 16	5.1	10.6
Montezuma, Ga.	152	20	8.6	15	4.3	31	5.9	4.1	Salem, Ore.	84	20	12.1	28	1.8	16-18	4.6	10.3
Albany, Ga.	90	20	10.7	14	5.1	9	7.6	5.6	Portland, Ore.	12	15	9.5	28	2.5	13	5.2	7.0
Bainbridge, Ga.	29	22	13.2	1	9.1	9, 10	11.1	4.1	<i>Sacramento River.</i>								
<i>Chattahoochee River.</i>									Red Bluff, Cal.	201	23	20.0	29	5.0	7-11	9.6	15.0
West Point, Ga.	239	20	3.6	11, 10, 13, 14, 22	2.7	31	3.2	0.9	Sacramento, Cal.	64	25	21.9	31	18.0	13	20.0	3.9
Eufaula, Ala.	90	40	9.2	13	3.0	31	5.5	6.2									

Small figures indicate number of days river was frozen.

(*) 16 days only.

(b) 8 days only.

(c) 10 days only.

Honolulu, Hawaii, latitude, 21° 19' north, longitude 157° 52' west; barometer above sea, 38 feet; gravity correction, —.057 applied. March, 1905.

Day.	Pressure.*		Air temperature.				Moisture.				Wind.				Precipitation.		Clouds.					
	8 a. m.	8 p. m.	8 a. m.	8 p. m.	Maximum.	Minimum.	8 a. m.	8 p. m.	8 a. m.	8 p. m.	8 a. m.	8 p. m.	8 a. m.	8 p. m.	8 a. m.	8 p. m.	8 a. m.	8 p. m.	8 a. m.	8 p. m.	8 a. m.	8 p. m.
							Wet.	Relative humidity.	Wet.	Relative humidity.	Direction.	Velocity.	Direction.	Velocity.	Amount.	Kind.	Direction.	Amount.	Kind.	Direction.	Amount.	Kind.
1	30.06	30.08	66.5	67.8	74	66	64.8	91	63.3	78	n.	3	ne.	7	0.03	0.04	10	N.	n.	9	S.-cu.	ne.
2	30.09	30.06	68.5	67.3	75	63	64.0	78	61.3	71	ne.	4	ne.	14	0.00	0.00	2	S.-cu.	e.	12	S.-cu.	0
3	30.06	30.00	70.0	70.0	78	64	62.0	64	64.0	72	e.	6	ne.	7	0.00	0.00	few.	S.-cu.	e.	few.	S.-cu.	ne.
4	29.98	29.90	71.4	71.3	76	64	66.9	79	67.2	81	nw.	2	w.	3	0.00	0.06	8	A.-cu.	sw.	9	S.-cu.	ne.
5	29.91	29.90	73.2	67.9	75	65	67.2	73	61.9	71	sw.	22	n.	9	0.01	0.10	3	Cl.-s	sw.	2	S.-cu.	0
6	29.99	29.99	67.4	64.4	72	60	58.4	58	57.8	67	nw.	11	n.	8	0.00	T.	5	S.-cu.	sw.	10	N.	ne.
7	30.03	29.98	64.3	64.5	71	57	58.8	72	57.2	64	nw.	5	n.	5	T.	T.	3	S.-cu.	nw.	12	S.-cu.	0
8	29.97	29.94	67.4	66.8	71	58	59.4	62	60.5	72	e.	3	n.	5	0.00	0.00	1	S.-cu.	0	12	S.-cu.	n.
9	29.96	29.91	68.5	67.0	77	62	63.0	74	58.5	69	nw.	6	ne.	10	0.00	T.	1	S.-cu.	nw.	few.	S.-cu.	n.
10	29.93	29.92	66.5	65.9	73	59	59.2	65	57.4	59	nw.	3	n.	9	0.00	T.	1	S.-cu.	ne.	few.	S.-cu.	nw.
11	29.97	29.93	66.2	64.4	72	62	55.7	51	56.1	59	ne.	6	ne.	9	0.00	0.00	1	S.-cu.	ne.	0	0	0
12	29.97	29.97	68.5	68.0	71	57	60.9	64	60.0	62	ne.	2	nw.	5	0.00	0.00	few.	S.-cu.	0	few.	S.-cu.	0
13	30.03	30.05	67.4	65.3	74	61	58.9	60	56.2	56	n.	8	nw.	5	0.00	0.00	2	S.-cu.	nw.	few.	S.-cu.	nw.
14	30.11	30.08	67.5	65.5	73	61	56.5	50	57.0	59	n.	3	ne.	8	0.00	0.00	1	S.-cu.	n.	few.	S.-cu.	0
15	30.09	30.07	69.3	69.1	74	62	61.0	62	62.2	68	se.	5	sw.	4	0.00	0.00	1	Cu.	s.	0	0	0
16	30.12	30.13	71.0	71.0	75	63	63.6	66	65.2	73	n.	2	n.	2	0.00	0.00	1	Cu.	n.	0	0	0
17	30.17	30.16	73.5	70.0	75	66	67.0	71	65.0	77	e.	4	ne.	5	0.00	0.00	4	A.-s.	w.	5	A.-cu.	w.
18	30.19	30.13	72.4	71.4	82	65	65.0	67	64.9	70	s.	3	ne.	5	0.00	0.00	1	Cu.	0	few.	S.-cu.	ne.
19	30.17	30.13	73.0	70.2	80	68	63.2	58	62.7	66	e.	4	ne.	12	0.00	0.00	3	S.-cu.	e.	few.	S.-cu.	ne.
20	30.16	30.16	74.2	71.8	80	67	64.2	58	65.0	70	ne.	6	se.	5	0.00	0.00	1	S.-cu.	e.	1	Cl.-s.	0
21	30.17	30.15	74.3	72.5	80	68	66.0	64	65.3	68	n.	2	ne.	4	0.00	0.00	2	Cl.-s	w.	4	S.-cu.	e.
22	30.17	30.15	71.3	71.0	80	69	61.0	67	65.0	72	ne.	14	ne.	12	T.	0.00	6	S.-cu.	e.	2	S.-cu.	ne.
23	30.15	30.11	74.0	72.0	79	70	65.1	61	65.2	70	ne.	9	ne.	8	0.00	0.00	4	Cl.-s	w.	3	S.-cu.	ne.
24	30.11	30.10	74.3	71.0	78	68	65.3	61	63.0	64	e.	11	ne.	11	0.02	T.	4	S.-cu.	e.	2	S.-cu.	e.
25	30.15	30.14	74.5	72.0	78	70	64.5	58	65.0	69	ne.	9	ne.	11	0.00	T.	1	Cu.	e.	1	S.-cu.	0
26	30.16	30.14	73.7	72.4	78	68	66.0	66	65.4	69	e.	12	ne.	7	0.01	0.05	7	S.-cu.	e.	7	N.	ne.
27	30.12	30.10	74.2	72.7	78	67	67.0	68	66.0	70	ne.	8	ne.	13	0.06	0.01	6	S.-cu.	ne.	5	S.-cu.	ne.
28	30.13	30.09	75.2	72.2	77	69	65.2	58	65.3	69	ne.	9	ne.	15	0.01	T.	5	Cl.-s	w.	6	N.	0
29	30.11	30.08	73.4	73.1	79	69	65.4	65	65.1	65	e.	16	ne.	12	T.	0.01	5	N.	e.	3	S.-cu.	e.
30	30.10	30.06	74.5	72.5	78	69	66.0	64	64.0	63	ne.	18	e.	12	0.00	0.00	1	Cl.-cu.	0	3	S.-cu.	e.
31	30.07	30.03	73.0	72.4	79	69	65.0	65	64.9	67	e.	9	e.	7	0.00	T.	4	Cl.	w.	2	S.-cu.	e.
Mean	30.077	30.033	70.9	69.4	76.2	64.7	63.2	65.2	62.5	67.8	ne.	7.2	ne.	8.0	0.16	0.28	3.5	S.-cu.	e.	3.1	S.-cu.	ne.

Observations are made at 8 a. m. and 8 p. m., local standard time, which is that of 157° 30' west, and is 5^h and 30^m slower than 75th meridian time. *Pressure values are reduced to sea level and standard gravity.

COSTA RICAN CLIMATOLOGICAL DATA.

Communicated by Mr. H. PITTIER, Director, Physico-Geographic Institute.

TABLE 1.—Hourly observations at the Observatory, San José de Costa Rica, during March, 1905.

Hours.	Pressure.	Temperature.	Relative humidity.	Rainfall.		Temperature of the soil at depth of—							
				Amount.	Duration.	Sunshine.	Cloudiness.	6 inches.	12 inches.	24 inches.	48 inches.	6 inches.	12 inches.
1 a. m.	26.19	61.9	85										
2 a. m.	26.17	61.5	84										
3 a. m.	26.15	60.8	83										
4 a. m.	26.15	60.4	83										
5 a. m.	26.16	59.9	84										
6 a. m.	26.17	59.7	84										
7 a. m.	26.18	60.3	79										
8 a. m.	26.19	63.5	73										
9 a. m.	26.20	68.3	63										
10 a. m.	26.21	74.4	51										
11 a. m.	26.20	78.0	46										
Noon	26.18	79.1	46										
1 p. m.	26.16	81.7	42										
2 p. m.	26.14	80.2	48										
3 p. m.	26.12	77.5	59	0.44	1.77	20.33							
4 p. m.	26.11	75.4	57	0.19	1.20	14.07	69	75.4	74.3	73.4	71.1		
5 p. m.	26.12	71.0	68	0.32	2.33	7.68							
6 p. m.	26.13	69.4	75	0.16	1.09	1.92							
7 p. m.	26.15	66.7	78				71	75.1	74.4	73.4	71.1		
8 p. m.	26.16	63.6	80	0.02	0.17								
9 p. m.	26.18	64.8	82	0.02	0.19								
10 p. m.	26.19	63.9	82				51	74.6	73.4	73.4	71.1		
11 p. m.	26.19	63.1	83										
Midnight	26.19	62.6	84										
Mean	26.17	67.9	70				49	73.9	73.8	73.3	71.1		
Min	26.05	54.0	18										
Max	26.28	90.9	100										
Total				1.15	6.06	236.88							

REMARKS.—At San José the barometer is 3835 feet above sea level. Readings are corrected for gravity, temperature, and instrumental error. The hourly readings for pressure, and wet and dry bulb thermometers, are obtained by means of Richard registering instruments, checked by direct observations every three hours from 7 a. m. to 10 p. m. The thermometers are 5 feet above ground and are corrected for instrumental errors. The total hourly rainfall is as given by Hottinger's self-register, checked once a day. The standard rain gage is 5 feet above ground. Since January 1, 1902, observations at San José have been made on seventy-fifth meridian time, which is 0 hours, 36 minutes, 13.3 seconds in advance of San José local time.

TABLE 2.—Rainfall at stations in Costa Rica, March, 1905.

Stations.	Rainfall.		Stations.	Rainfall.	
	Amount.	Number of days.		Amount.	Number of days.
Sipurio (Calamancia).....	1.38	6	Peralta	0.16	6
Boca Banano.....	3.07	10	Juan Vinas	0.12	2
Rearesem.....	3.19	5	Santiago	0.71	3
Limon.....	5.47	7	Cachi	0.12	6
Swamp Mouth.....	0.35	7	Paraiso.....	0.00	0
Zent	2.64	9	Las Conchas.....	0.20	5
Victoria	2.36	10	Tres Rios.....	0.04	2
La Luisiana.....	2.32	4	San Jose.....	1.15	7
Iroquois	2.56	10	La Verbana.....	1.73	6
Guapiles	26.69	12	Nuestro Amo.....	2.72	6
San Carlos.....	3.23	7	Alajuela	1.38	6
Madre de Dios	0.55	6	S. I. de Olajuela.....	1.54	3
Las Lomas	0.51	4			

Notes on earthquakes.—March 10, 8^h 18^m p. m., light shock NW.—SE., intensity I, duration 2 seconds. March 14, light shock E.—W., duration 3 seconds, intensity I. March 21, very light shock, elements indefinite. March 27, 10^h 55^m p. m., NE.—SW., intensity II, duration 5 seconds.

Chart I. Tracks of Centers of High Areas, March, 1905.

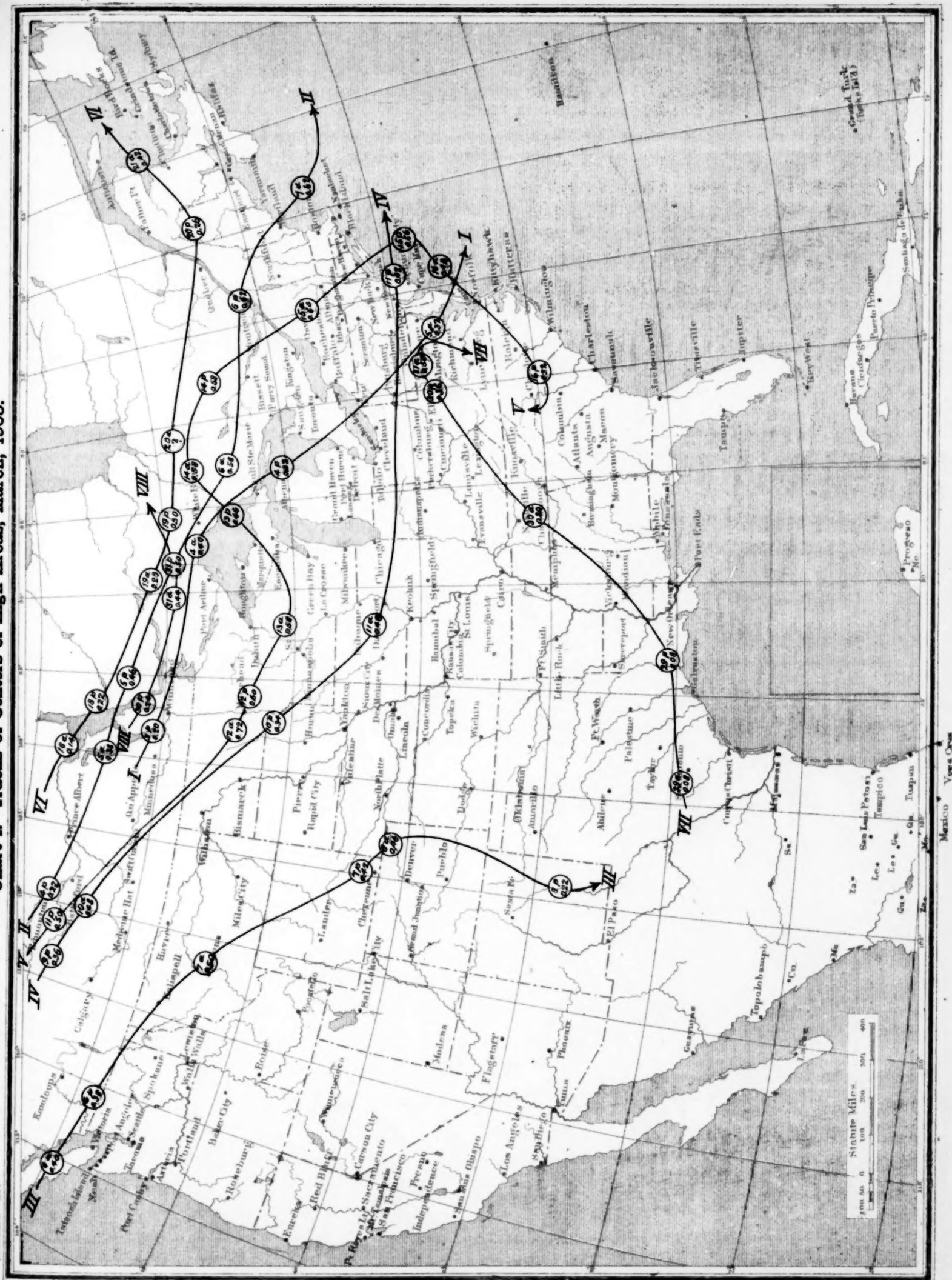


Chart II. Tracks of Centers of Low Areas, March, 1905.



Chart III. Tracks of Centers of Low Areas, March, 1905.

Chart III. Total Precipitation, March, 1905.

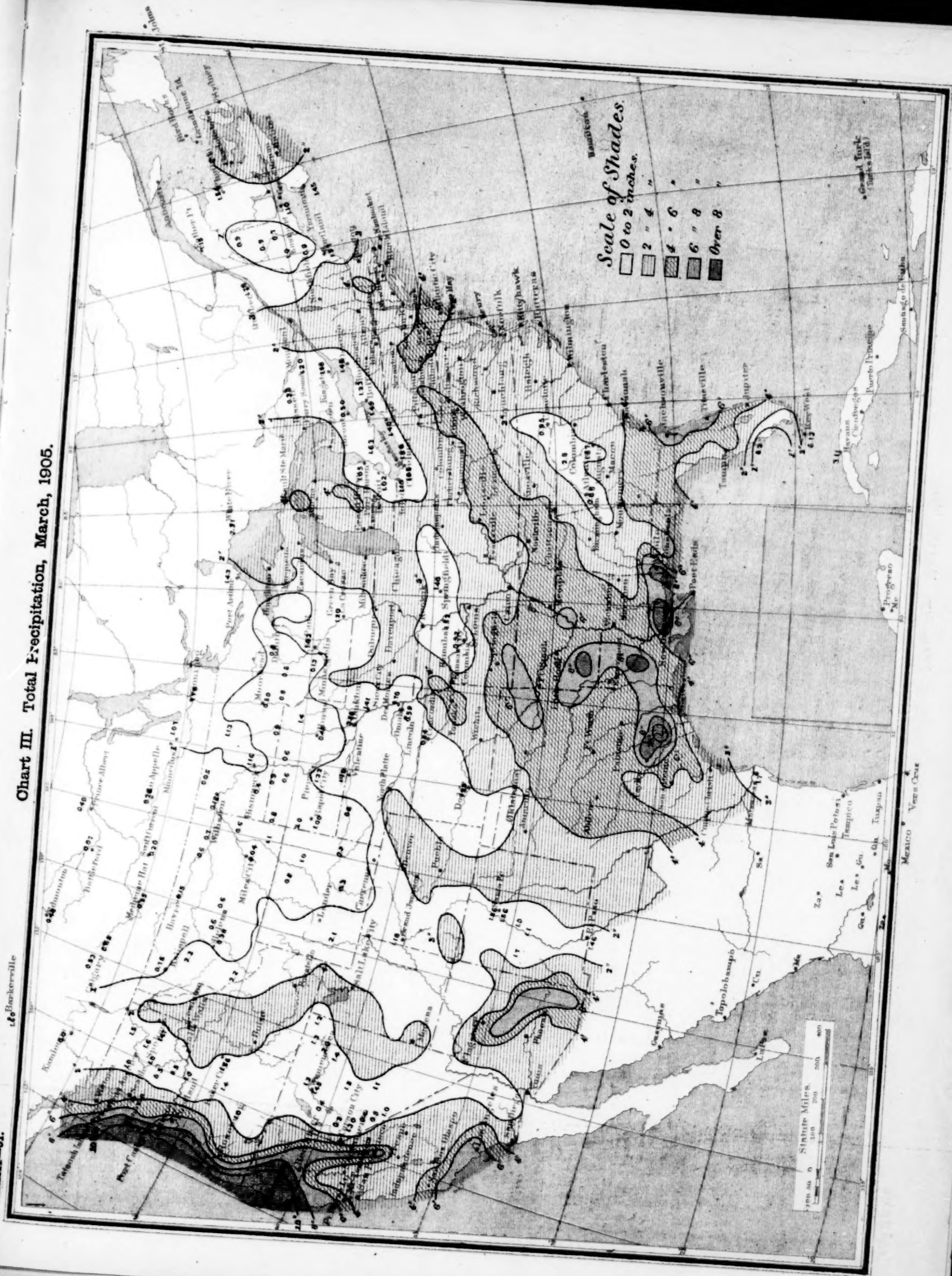
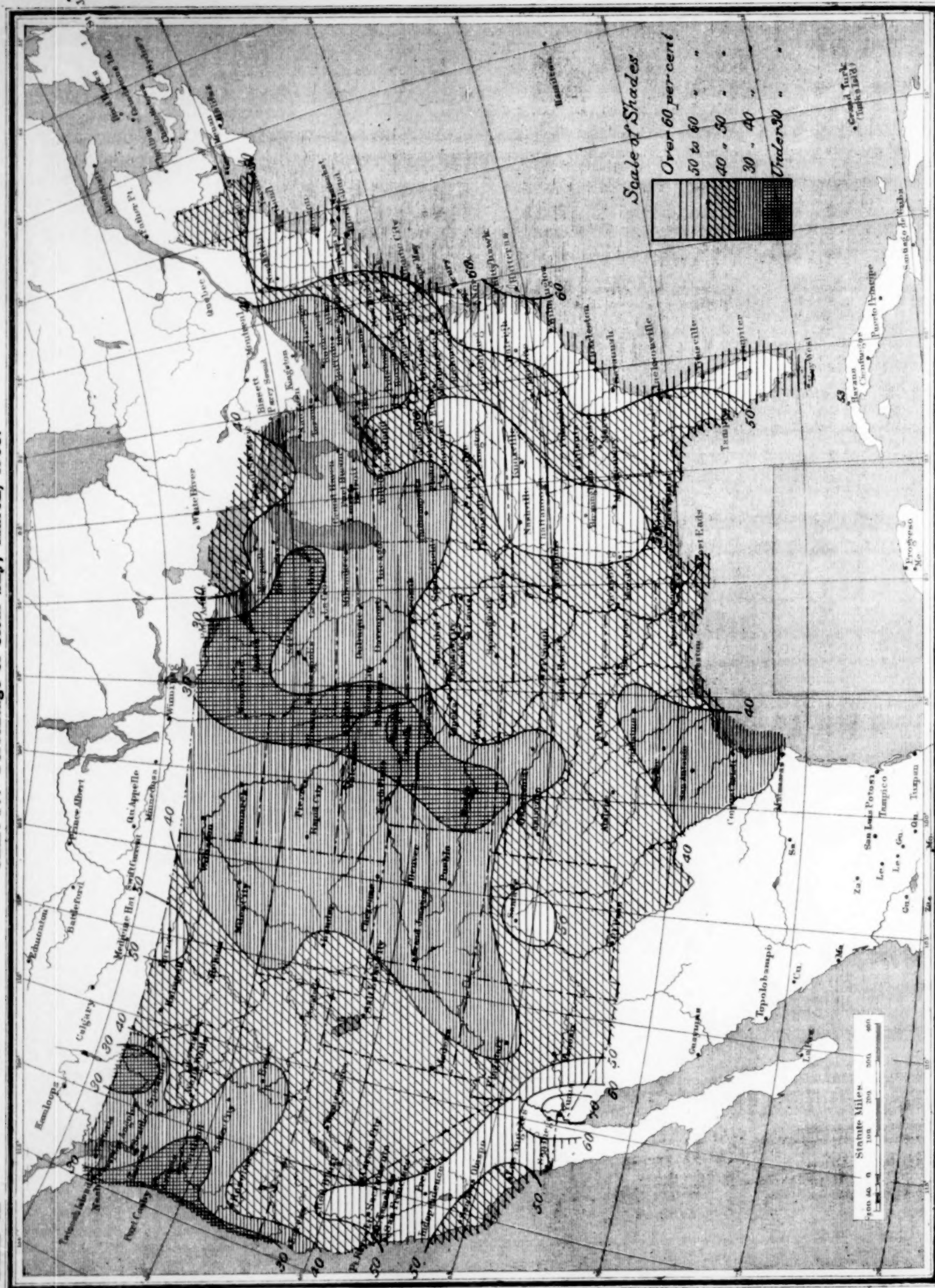


Chart IV. Percentage of Clear Sky, March, 1905.



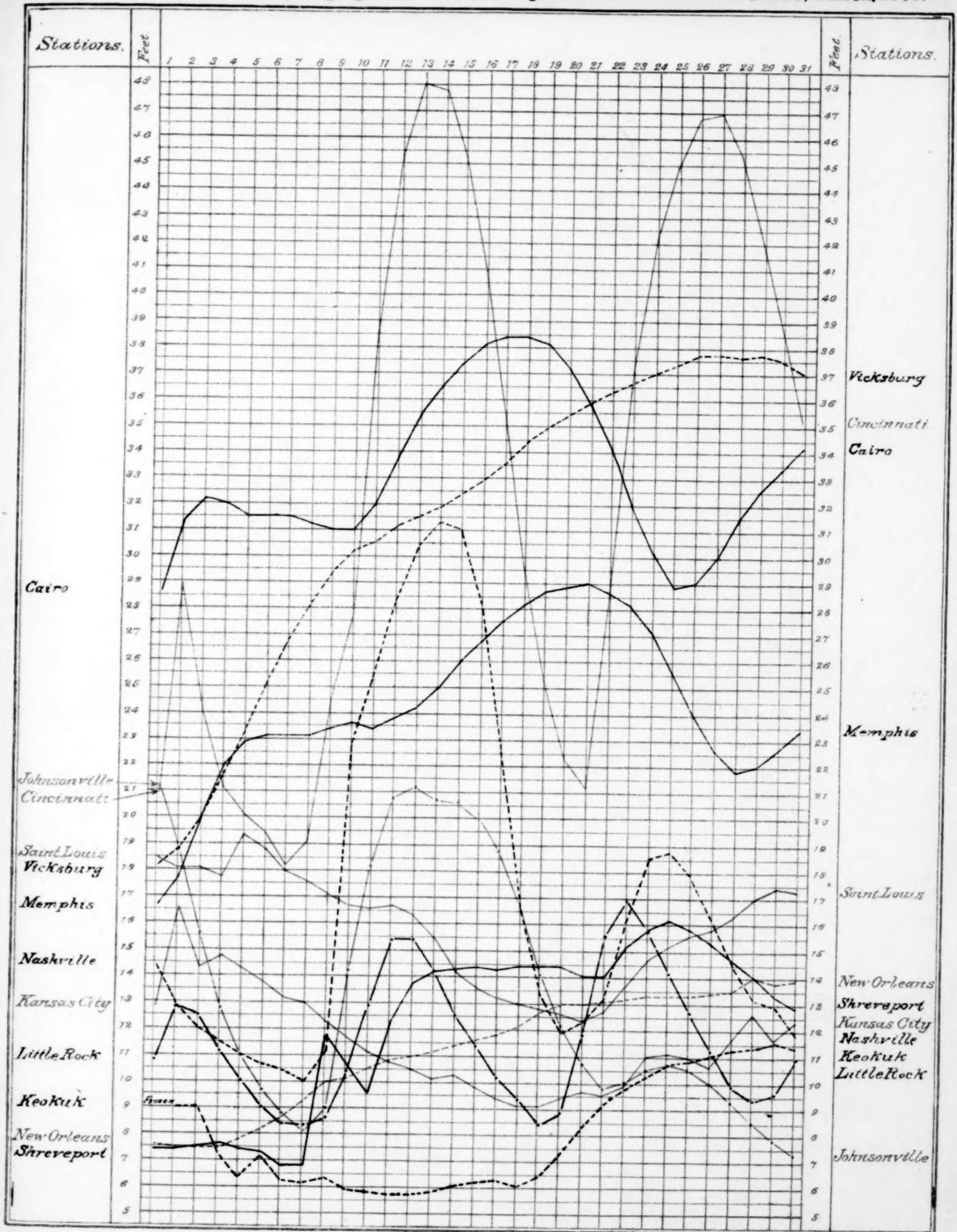
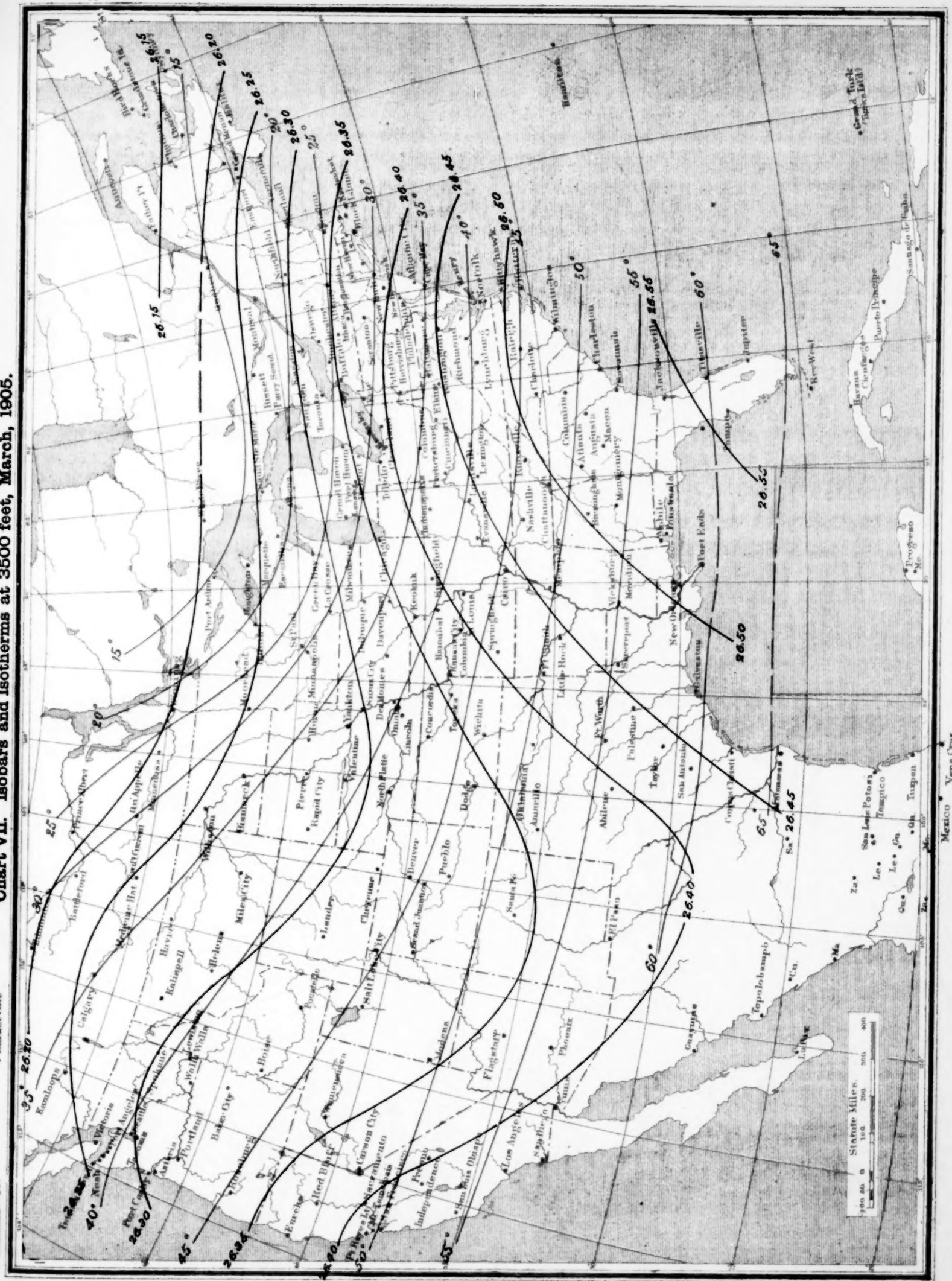
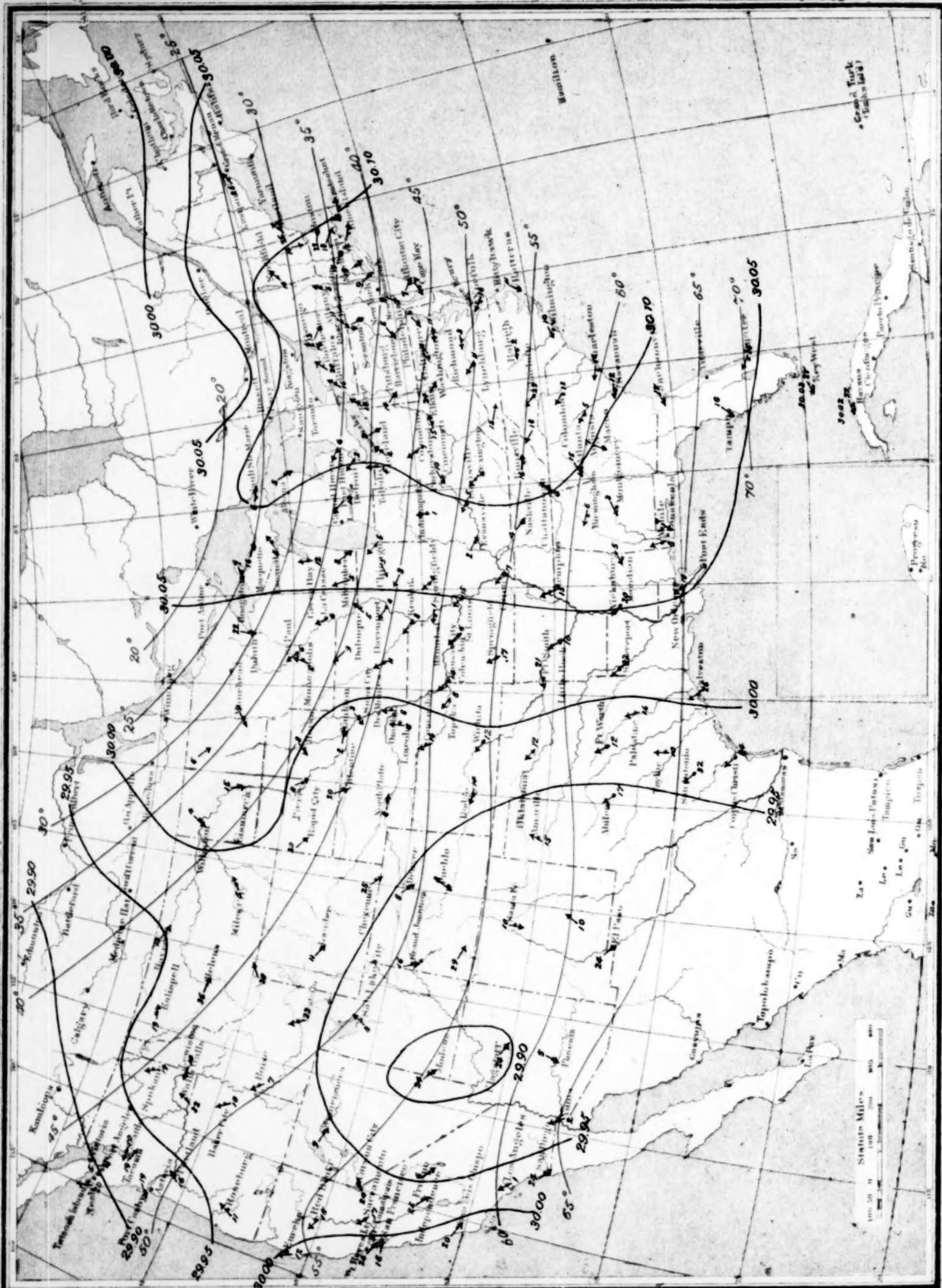


Chart VII. Isobars and Isotherms at 3500 feet, March, 1905.





1000

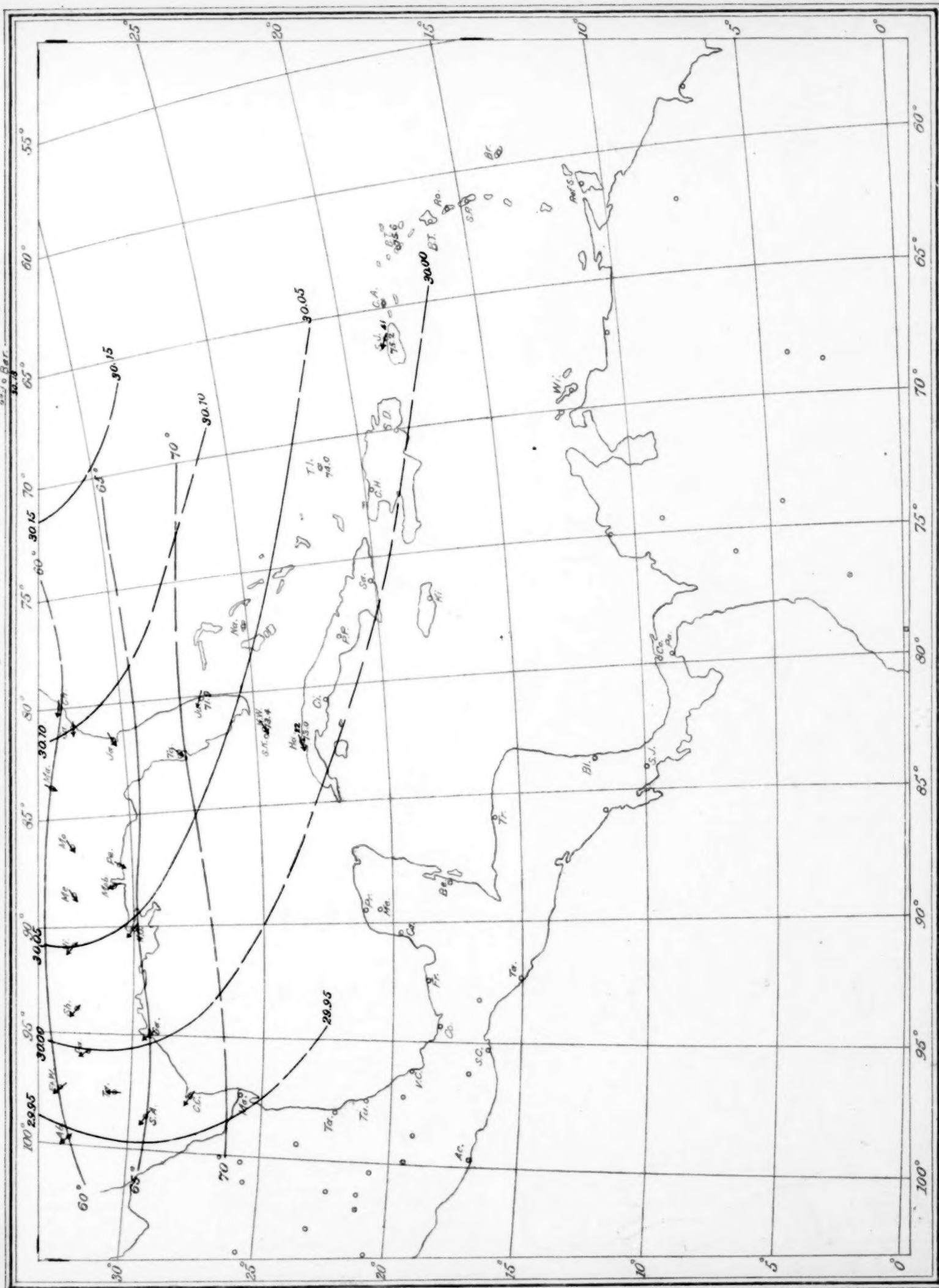


Chart X. Total Snowfall for March, 1905.

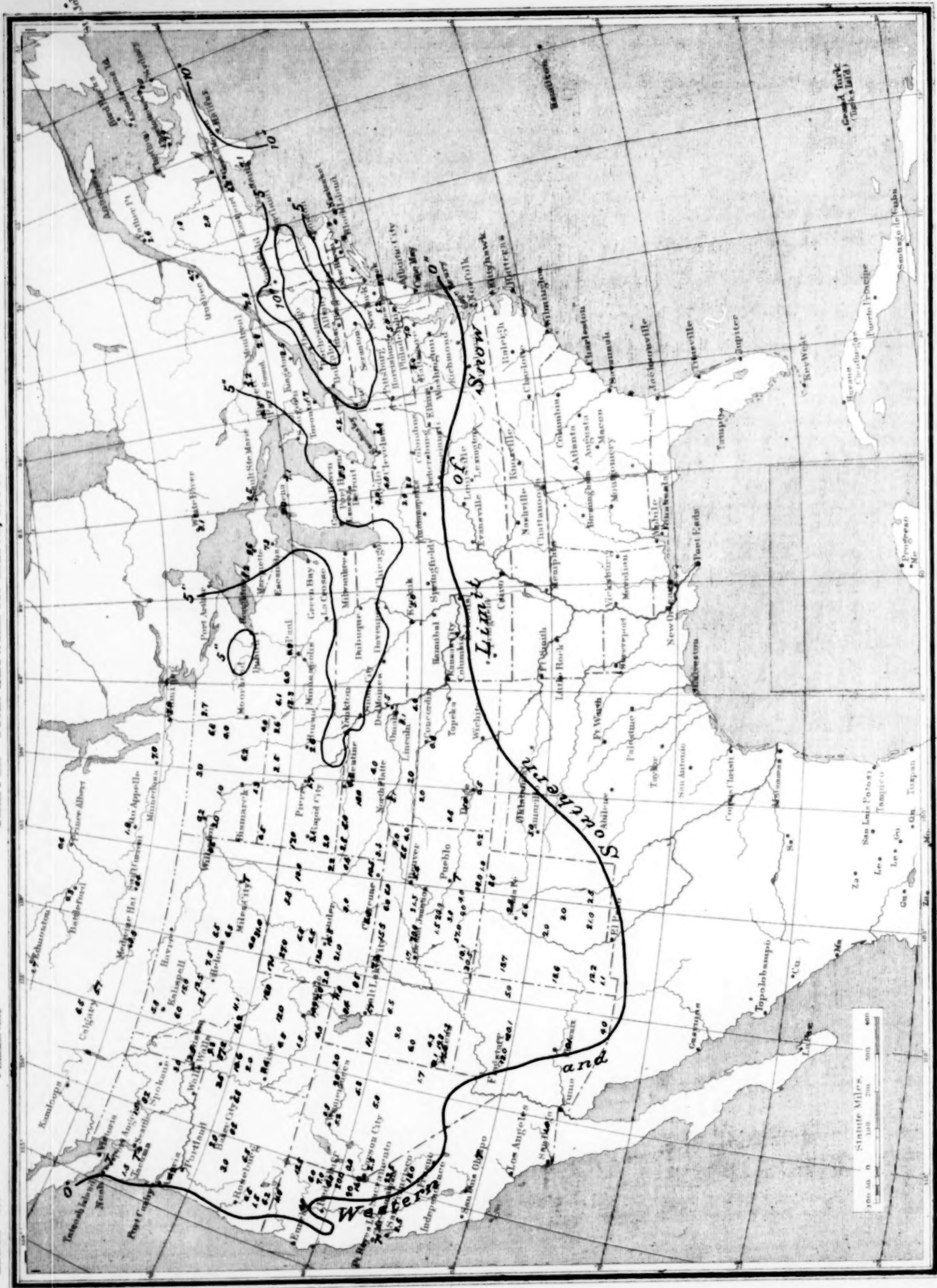


Chart XI. Diurnal (I. —), Semidiurnal (II. ---), and Tridiurnal (III. ----) Components of Pressure and Temperature.

XXXIII-39.

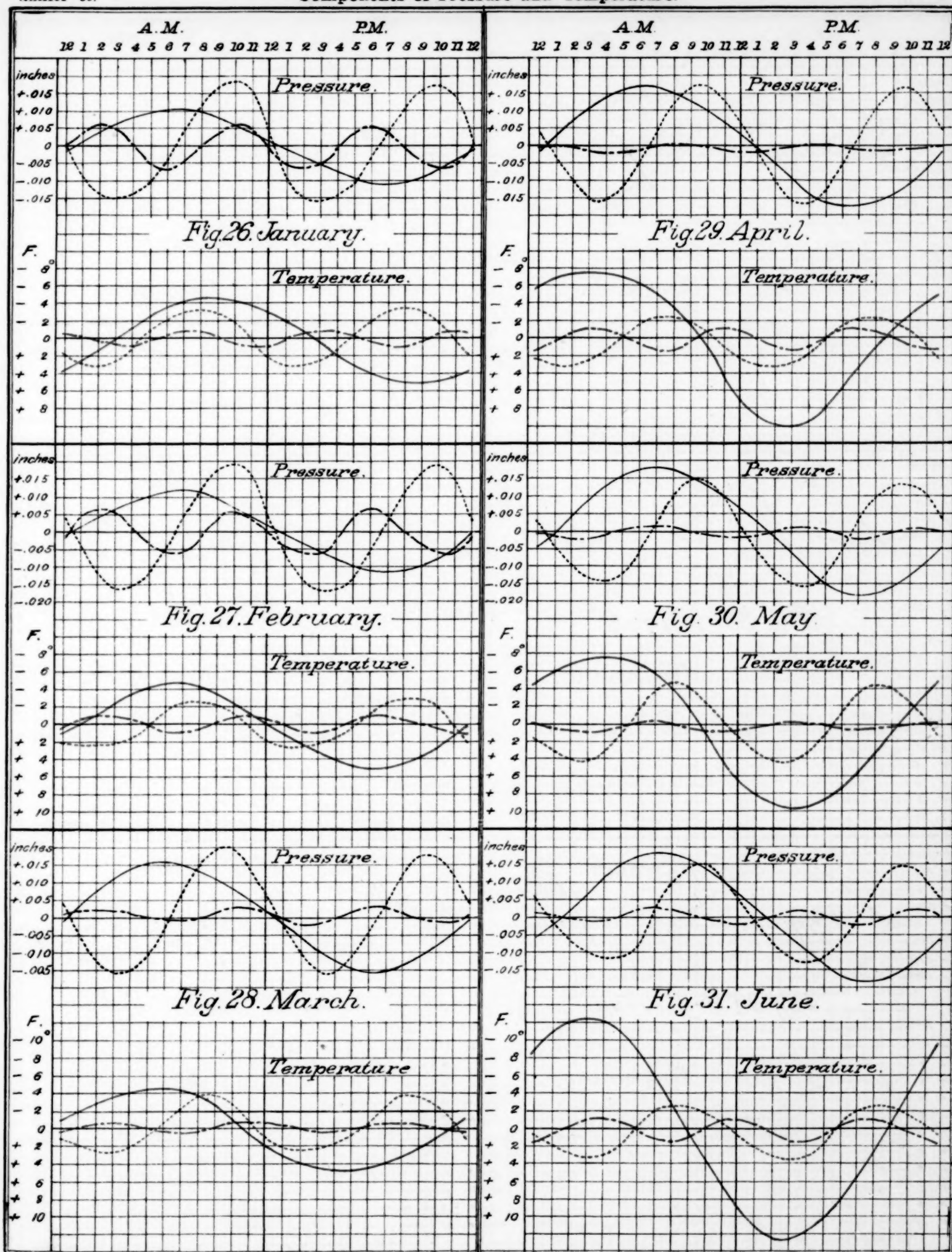


Chart XII. Diurnal (I. —), Semidiurnal (II. ----), and Tridiurnal (III. - - - -) Components of Pressure and Temperature.

